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A. S. JENNINGS

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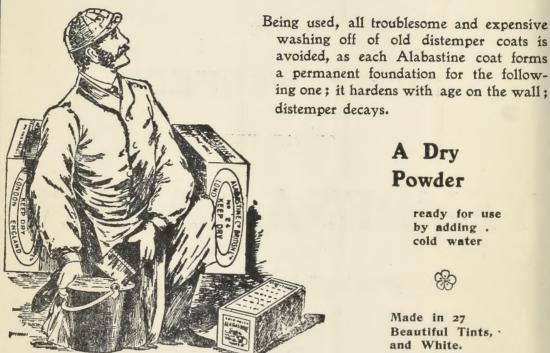
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With Thirteen Coloured Plates.

ARTHUR SEYMOUR JENNINGS,

Editor of "The Decorator," Author of "Wall Papers and Wall Coverings," "Practical Solid Geometry," etc., etc. Honorary Consultative Examiner in Painters' and Decorators' Work to the City and Guilds of London Institute. Member of the International Society for Testing Materials.

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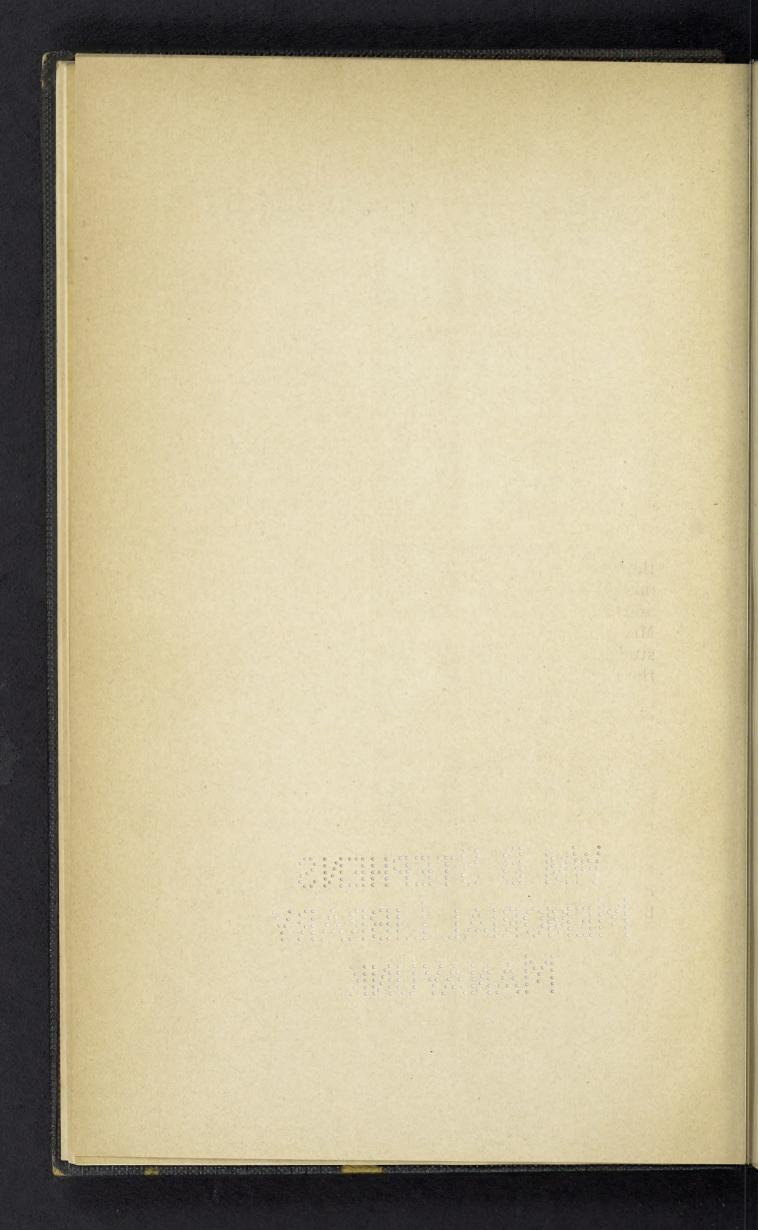
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PREFACE TO THE THIRD EDITION.

ANOTHER edition of this book being called for, the Author has taken the opportunity of adding several chapters dealing with subjects not previously included. The most important of these are "Mixing Paints and Colours on the Manufacturing Scale," and "Artists' Water Colours and How to Mix Them."

The latter subject is dealt with at considerable length, and a complete list of artists' water colours is given, with notes on the origin and properties of each, several typical palettes and hints as to the mixtures of colours which are used in water colour painting.

A chapter on "Glazing" has also been given, and the whole of the work, and especially the lists of colour mixtures, has been carefully revised and considerably added to. Another new chapter, "How to Learn to Mix and Match Colours" suggests a course of practical study and experiment by which the reader may learn the subject in a thorough manner.

Perhaps the most important improvement, however, is the increased number of coloured plates. In the first edition there were but four; in this there are thirteen, comprising in all 287 different colours, all of them being executed in the actual material they represent; that is to say, either oil paint, distemper, or artists' water colour. This feature is of importance because matches of any colour included in the plates may be made by using pigments and following the detailed instructions given, while it would be impossible if printers' or lithographic inks had been used.

The Author in the first edition said that he had ample justification for the publication of the book in the fact that he had during the last twenty years received, in his capacity as editor of painters' publications, inquiries almost daily for a book giving colour

mixtures, with actual samples of colours; in other words, one which would be useful to the man who wanted to mix paints, but who had not made a study

of the subject.

Two editions, each of two thousand, having been sold, it would appear that this view was not a mistaken one, and now that an earnest attempt has been made to add to the usefulness of the book it is hoped that it will interest many who have not purchased the earlier editions.

A critic might object that it is impossible to give accurate colour mixtures, because the appearance of colour varies according to the light in which it is viewed, and also because the result obtained by mixing coloured pigments of different manufacture must vary greatly according to the quality of those colours. All these objections have been carefully borne in mind in the preparation of the contents of this work. It has been assumed that the colour mixtures will be viewed in an average good light, and it is further assumed that the colours employed will not necessarily be of the very best quality, but certainly not those which are very inferior.

It need only be added that every one of the mixtures given in this work has again been carefully tested with the actual colours. The preparation of

the lists has been no inconsiderable work.

The Author cordially invites correspondence, and he takes the opportunity of returning thanks to many readers, both at home and abroad, who have sent him words of appreciation of his work, and also to many paint and colour manufacturers who have kindly supplied him with their colour cards and lists which have been most useful for comparison.

ARTHUR S. JENNINGS.

62, Barry Road,
Dulwich, London, S.E.

December, 1906.

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THE COLOURED PLATES.

- [Note.—A full description of each plate will be found at the end of the book, next to Index (see pages 178 to 185).]
- PLATE I.—This shows eight different body colours in common use with tints of the same produced by adding 15 parts and 30 parts respectively of white lead, making 24 colours in all.
- PLATE II.—This shows eight different graining grounds, and eight oil colours used in everyday work. Instructions for mixing all of them will be found within.
- PLATE III.—This plate gives sixteen different useful colours.
- PLATE IV.—This plate gives thirty named colours standardised by ascertaining the popular opinion of several thousands of colour experts as explained within.
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CHAPTER I.

PAINT AND COLOUR MIXING: INTRODUCTION.

The Composition of a Paint.—Clearly the first thing to be done before studying the subject of paint and colour mixing is to define "paint" and "colour." Without attempting to give a hard and fast definition, it may be said that a paint consists of any pigment, or pigments, such as white lead, tinctured or used plain, mixed with linseed oil, and thinned by means of turpentine to render it in such a condition that it may be readily applied to the surface of wood, iron and other work by means of a brush. Paint serves the purpose, first of preserving the material to which it is applied, and sometimes, but not always, a second purpose, namely, that of decoration or adding to the beauty of the object to which it is applied.

The principal pigment used in paint mixing is white lead, but there are many others that are also employed. Many painters look upon paint as necessarily consisting of white lead, to which has been added sufficient colouring matter to give the desired tint. As a matter of fact, white lead may be wholly absent from a paint. For example, yellow ochre or sienna may each be used by itself. Iron oxide in the shape of Indian red, purple brown, or Venetian red, form in themselves good paints if the colour is not objectionable. Red lead used by itself is a useful paint. Again, in the lighter paints, we sometimes have white lead replaced by an admixture of zinc oxide, barytes, lithopone, Charlton white, Orr's white, and other white pigments.

The oil used in mixing paint is principally used

to combine or unite together the particles of which the pigment is composed. It is also employed to give a glossy surface and to bring the material to a proper consistency. Turpentine could be used for the latter purpose by itself, but the result would be what is termed a "flat" surface, or an absence of gloss. The turpentine, too, evaporates almost wholly. It is generally conceded, among those who have given close attention to the subject, that the durability of a paint depends largely upon the oil used; indeed, it has been likened to the life blood of the paint. Recent investigation has shown that it depends also and to a very great extent upon the fineness of the particles. A perfectly pure, but coarsely ground pigment, when made into paint, will not last nearly so long as one which is finely ground.

There is not much doubt that the best pigments may be replaced with others somewhat inferior without so much detriment to the quality of the paint as if linseed oil is replaced by some other oil. It is quite necessary that pure linseed oil be used in the manufacture of all paints, and although there are one or two substitutes on the market which may be employed in very cheap work, no attempt should be made to execute a really good job unless pure linseed oil is The purpose of the oil in giving a gloss is sometimes assisted by the addition of a small quantity of oak varnish. This is a growing custom among painters, as the gloss produced is decidedly improved by the addition of the varnish, and the work shows up well, while the varnish does not in any way detract from the durability of the paint, but rather adds to it. This practice is employed more on outside than inside work, where the execution of the painting requires more care than it does inside, owing to the severe atmospheric conditions, which cause any paint work not properly prepared to soon decay.

For our present purpose "colour" may be defined as a pigment possessing a hue or colour in itself which it imparts to the white lead or other white pigment with which it is mixed, thus producing a series of "tints" according to the proportions employed. It is for this reason that colours in painter's parlance are frequently called "stainers," although the word is not quite correct, as it implies an effect similar to that which would be produced by the use of a stain or dye. As a matter of fact coloured pigments, when mixed with white ones, do not actually stain, but the particles lie side by side and become merged into each other when viewed at a little distance.

In mixing a paint the base, such as white lead, having been selected, a colour is mixed with it in order to produce the desired hue or tint. Frequently, however, a colour is made by the mixture of several colours, which are added to the base, or sometimes a single colour may be used by itself, or several colours without white at all may be employed.

The colour having been determined, oil, turpentine, and driers are then added. The object of the driers is that of causing the paint material to dry quickly. There are several kinds of driers on the market, but the two best known are termed "patent driers," which is sold in solid form, and the "liquid driers" or "japanners." Whichever is used, the actual quantity employed will depend very largely upon the pigment. Some pigments, such, for instance, as red lead, may be considered in themselves driers, and the addition of any other is unnecessary. Others, like Vandyke brown, dry slowly, and much more driers will be necessary than is the case with white lead. Further on we give some idea of the proportions of materials to be used, but it will be understood that no exact information on the subject will be possible, for reasons that will be explained. It is of the utmost importance to remember that an excess of driers is most objectionable. It often retards, instead of increasing, the drying quality, it causes cracks and blisters, and above all,

it proves very destructive to the paint itself.

The quality of patent driers varies very greatly, some of the cheaper grades consisting largely of material which possesses no drying properties whatever. Indeed, at the present day there is so much patent driers on the market that is largely adulterated that the author prefers to always use liquid driers, provided, of course, that its good quality has been clearly established. When the latter is used the proportions can very readily be ascertained and the danger of using an excess is avoided.

Another effect of using driers in excess is a somewhat peculiar one, and is worthy of mention here. The paint dries hard in rather less than the usual time, but after a week or two it gradually becomes soft, adhering to the hand or anything placed against it. The reason for this is that the paint dries only on the surface, owing to the excess of driers, and that the soft paint afterwards works through.

PIGMENT AND THINNERS.—It being now clearly understood that a paint consists of pigment such as white lead, mixed with oil in order to bind the particles together, and thinned with turpentine in order to render it of a suitable consistency for application by means of a brush, we may add a few remarks under each of these heads.

PIGMENTS.—The principal pigments used by the painter are, as already stated, white lead, zinc oxide, oxide of iron, and the various colours used for tinting purposes. White lead is manufactured either by what is known as the "old Dutch" process, also known as the "stack" process, or by one of the many new methods which are designed to effect a saving of time. Speaking broadly, the old Dutch process yields the best lead, although there are one or two exceptions, notably Brimsdown lead, which is manufactured by a new

process. It is a beautifully white and fine lead which is rapidly gaining great popularity among painters.

Genuine white lead, i.e., lead which is not adulterated, is always marked on the package, "Genuine White Lead." If any proportion of adulterant is added, the package is then marked "Reduced White Lead," so that the reader need have no hesitancy in purchasing lead, because the mark will tell him what its quality is. If any merchant or manufacturer sells adulterated white lead as pure, he renders himself liable to heavy penalties for contravening the provisions of the "Merchandise Marks' Act," and the White Lead Corroders Section of the London Chamber of Commerce order prosecutions in cases of the kind which come to their knowledge.

ZINC OXIDE has, in recent years, made great advances in popularity among painters. Compared to white lead, it is as white to yellow. It is indeed beautifully white, very fine, and easily worked. The whiteness is of importance in mixing paints, as the purity of colour is retained, while when mixed with lead the vellowish cast to some extent destroys the purity of the original colour. The fact that oxide of zinc is non-poisonous is a point in its favour of very considerable importance. It is claimed that painters who take care to wash themselves frequently are not likely to contract lead poisoning. This is doubtless true enough, but as a matter of fact, the best of painters are at times careless, while in the rush of work, it is often impossible to take the precautions required.

The most important quality of zinc oxide is its extreme durability. Properly mixed it will last, say at a moderate estimate, twice as long as lead, especially in large cities where the air is impregnated with sulphur derived from burning coal. Lead, in such circumstances, turns yellow or black and quickly decays, and some places, such as stables, where sulphuretted

hydrogen abounds, it is useless to paint with white lead, and if zinc is used these disadvantages are avoided.

The practical reader will probably think, when he reads the foregoing, that while our remarks are true enough so far as they go, yet he will say that zinc oxide is open to the objection that it is lacking in "body."

In another chapter will be explained at length what "body" is, and it must be acknowledged that white lead is superior in body to most, if not all, other pigments. In fact, it is this quality which has caused it to be used for so many years, notwithstanding its other shortcomings. Zinc oxide has a very good body, probably as good as white lead. If a proper comparison be made, and if both be thinned out to a consistency suitable to be applied by brush, it is true that zinc will apparently not have so good a body as lead, but it will spread much farther. If an exactly equal quantity of lead and zinc are both painted on an exactly equal area, zinc will cover a little better than lead. In this state, however, the consistency of the zinc paint would be rather too thick for application with a brush, but it can, of course, be thinned very readily by adding oil.

A careful consideration of these facts will show the practical painter that he will require really less zinc than he will lead to perform a good job, and when the durability is also taken into consideration as well as the beauty, it will not take long for him to make up his mind as to the superiority of zinc.

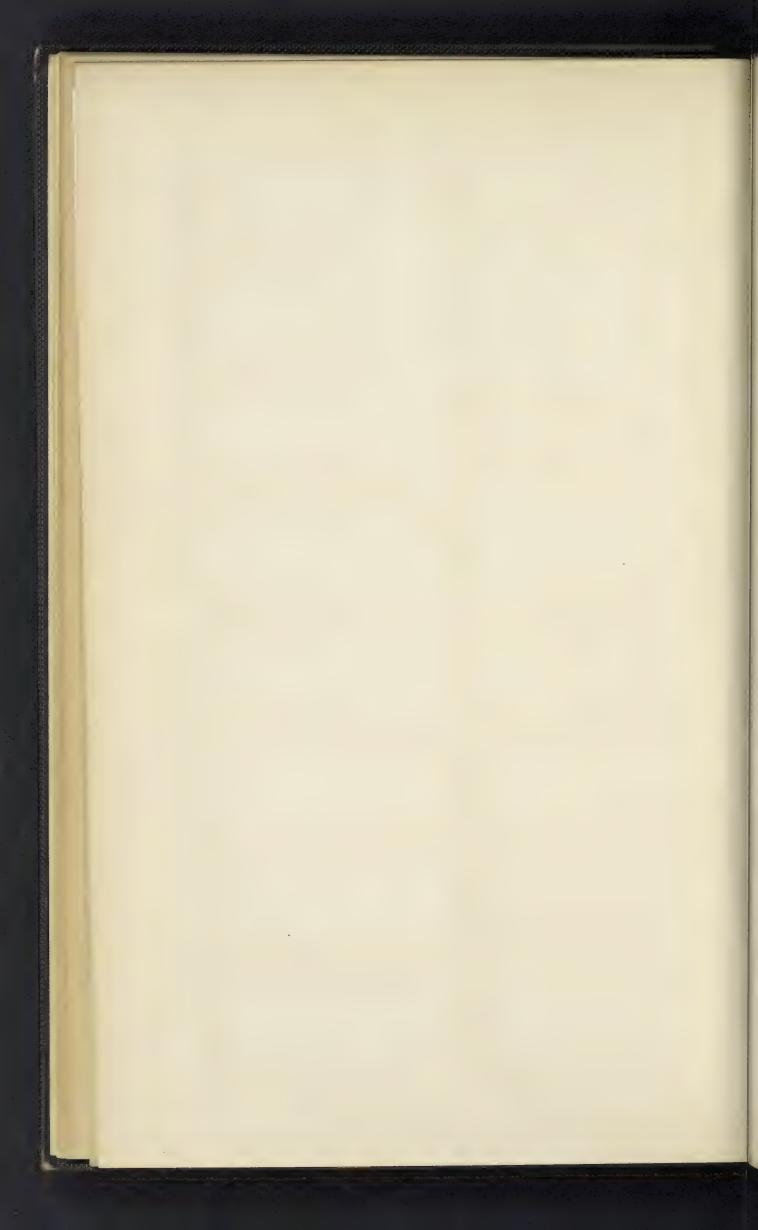
There is one point, however, about its use which must be very clearly explained. Zinc oxide is, when compared with lead, quite light in weight, or, in other words, its volume is much greater than lead. Now, it being an entirely different product, it must not be treated in the same way as lead would be. The painter, perhaps, takes some zinc, mixes it with raw oil, with a liberal amount of patent driers and a more

PLATE II.



Graining Colours.

Samples of Colours.



liberal dose of turpentine, and then he grumbles because it does not show up to advantage. What he does is to destroy its inherent good qualities. To repeat then, zinc oxide must *not* be treated in the same way as white lead. Anchovy sauce is excellent for fish, but would be rather distasteful with a chop or steak. So with these two important white pigments.

The proper way to treat zinc oxide is to mix it with refined boiled oil, i.e., no driers should be used, and only just sufficient turpentine to bring it to the required consistency. Refined boiled oil may be had without difficulty from a number of makers. Being pale, it does not destroy the whiteness of the zinc, while it certainly aids considerably in drying. It is paler than raw linseed oil, and hence it does not destroy the most delicate tints, however light. will be observed that the words "zinc oxide" have been used in the above paragraphs instead of "zinc white," the term by which the pigment is usually known among painters. The reason for this is that the latter term is not infrequently applied to an entirely different class of pigments of which Orr's white, Charlton white, and lithopone are the best known examples.

Thinners.—Linseed oil is the principal vehicle used by painters. It is expensive, but no other oil can compare with it for good service. It is used both raw and boiled. Frequently a proportion of each is used in paint. Boiled oil is linseed oil, which has been heated to about 350° to 500° F. This causes the oil, when cool, to dry much quicker but dryers are with the same object usually added while the oil is hot. Boiled oil should dry hard in about twenty-four hours, and a good test is to paint a little on a watch glass. At the end of twenty-four hours it should have dried quite hard. There is a great difference of opinion among painters as to the proper use of boiled and raw oils. Some prefer to use boiled oil

almost always, while others are of the opinion that the less used the better. The author's opinion is that good boiled oil may safely be used if mixed with the proper proportions of raw oil, depending upon the class of work to be done, and that this produces far better work than it is possible to obtain by the practice so frequently carried on of adding driers in excess to paint.

Turpentines used in paint be pure. American turpentine is mostly used. Owing to its high price it is sometimes adulterated, with disastrous effects upon the paint. It should be perfectly white in colour, and its purity can roughly be tested by dropping a little on a sheet of writing paper. If it is adulterated, a greasy spot will remain, while if pure it will wholly disappear in a few minutes. When the adulterant is mineral oil it can usually be detected by the peculiar blue colour it gives to the turpentine.

Although American turpentine has for so many years enjoyed a practical monopoly among English painters, the Russian product has of late become very much more popular, and bids fair to prove a very formidable rival. The old adage that "necessity is the mother of invention" may aptly be applied to the condition of things concerning turpentine in recent American turps were very high in price, with no prospect of their lowering, as the pine forests are rapidly becoming exhausted. Painters therefore are compelled to look for something to take the place of American turps. One or two enterprising firms took up the question of Russian turpentine. Painters who have tried this have objected to it on account of its smell, but experience proved that it was quite possible to remove this objection almost wholly, and to obtain a turpentine practically water white which hould answer for the purpose of American turpentine, n fact, be identical with it in appearance, behaviour, flash point and specific gravity, with perhaps a slight difference in smell, but nothing in the least objectionable. The most satisfactory substitutes at present on the market may be divided into three groups (a) The Russian and French turpentines; (b) Spirits of petroleum origin, and (c) Liquids produced by distillation of various pine products other than crude American turpentine. To these might be added the various mixtures which consist simply of blends of pure turpentine and petroleum spirit in proportions depending upon the price at which they are to be sold.

An excellent turpentine which the author finds is equal to American in most respects, but is much cheaper, is termed "Canadian Turps," and is sold by Messrs. Dixon and Heydorn, 20, St. Dunstan's Hill, London, E.C.

Spirits of petroleum origin are likely to prove—indeed are proving—very successful. Ordinary petroleum, such as lamp oil, would be useless in a paint because it possesses no drying properties, while the lighter distillations of the same product, such as benzine, would be suitable if they did not evaporate so quickly. The efforts of the manufacturers have produced petroleum spirits which possess neither of the objections mentioned, and they are increasing in use every day.

SPECIAL THINNERS.—It is somewhat extraordinary that notwithstanding the care taken by enterprising paint manufacturers to improve the quality of their paint, it is only in recent years that any attempt has been made to sell special thinners. Just as a paint may be manufactured on a large scale by the aid of machinery, so a thinner might be prepared for use with special paints that would give quite satisfactory results and save considerable time in the mixing.

We may mention a firm who manufacture special thinners, viz., Messrs. Gross, Sherwood and Heald, Ltd., who make a paint called "Leadwhite," which is of unusually fine quality, and is used with a special

thinner called the "Grosswood Drying Medium." Messrs. Craig and Rose, Ltd., also manufacture a special paint called "Permadure," which the author has had the opportunity of testing, and which he finds of superior quality. This, too, is used with special thinners called the "Permadure Thinners."

PAINT MIXING.—For ordinary quantities of paint, the following is the method usually employed in mixing. A can or kettle is most usually employed for mixing the white lead or other base, and this is first thinned out and mixed with the driers and oil, the colour being afterwards added to it. It saves time to well beat up the lead with a wooden spatula, shaped like an oar or spade, before adding thinners of any kind. This having been done, a little oil is first placed in the can, which is twisted around so that the oil covers every part of the inside surface. This prevents the lead sticking against the tin. A sufficient quantity of oil and the patent, or other driers, is then added. The lead is stirred and beaten against the sides of the tin until the whole is of the same consistency, and more oil is added until the thickness is not sufficient to support the stick standing upright. Turpentine may now be added to further thin the mixture, and then the colour is added. It may be noted here that the result is not so satisfactory if the turpentine is added before the oil.

The best way of mixing tinting colours is to place them on a stone, thoroughly amalgamating one with the other by means of a spatula. When the colour is what is required it is added to the white. To take a simple case of a gray, a little black would be beaten up on the stone, and when quite thin added to the pot of white. This would then be stirred up thoroughly and the grey colour observed to see whether it was sufficiently dark. Then a very little red and blue might be prepared on the stone and this be added to the pot, the mixture being again stirred. Two very

important rules must be observed at this point. first is that the colours ground in oil should be used and not dry colours. If dry colours are employed, oil must be added to them on the stone and not in the pot. We may repeat, by way of emphasis, that under no circumstances must dry colours be added to the pot of colour. This is a rule to which there is no exception. The second rule, and one which is equally important, is to add only a small quantity of colour to the pot of white at the time. Taking the case once more of the grey, a little black being added and the mixture well stirred, it can be seen at a glance whether the desired depth of shade is obtained. On the other hand, it would be quite impossible to take any of the black from the mixture, and should it be too dark, the only way to lighten it would be to add more white, and this would probably mean mixing much more paint than was required for the job.

It will be understood that the above description of mixing refers to ordinary jobs such as are required in painting a house. When a considerable quantity of paint is to be mixed at the same time, a mechanical mixer may be used with great advantage. It is remarkable that painters do not use these paint mixers more frequently. They certainly effect a great deal of saving of time, and the outlay of a few pounds would be quickly repaid.

Since the first edition of this book was published in which it was recommended to use a machine for mixing paints, considerable progress has been made in this direction and many contractors now realise that whenever a large quantity of paint is to be mixed, it pays far better to use a machine than it does to use the old fashioned method. The author's opinion is that excepting, perhaps, in very small shops, it would pay every employing painter to purchase a good paint mixer.

PAINT MIXING MACHINES.—There are on the

market several types of paint mixing machines. One known as the "Wee Macgregor," is represented in Fig. 1, and is suitable for painters' use. It consists of a cylinder which contains the paint, and in this are three bent knives or paddles. The handle attached, on being operated, turns the cylinder in one direction and the knives in the opposite direction, these knives in the meantime revolving around on their own axes. The paint is thus mixed very quickly, and as the

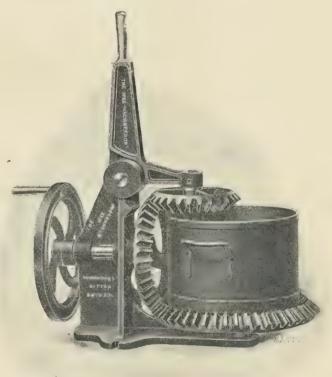


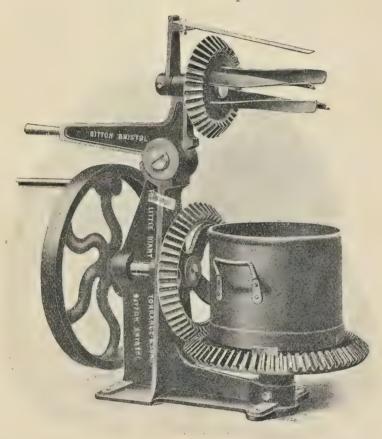
FIG. I.

cylinder may be had to hold $2\frac{1}{2}$ gallons, in the case of bridge work, wall work, or other positions where a very large quantity of the same paint is required, the purchase, for a few pounds, of such a machine may mean a saving of a considerable amount of labour.

Fig. 2 shows a similar machine when the handle is thrown back which lifts the mixing blades out of the cylinder, leaving it free to be lifted in order that the paint may be poured out.

The mixers illustrated in Figs. 1 and 2 are manufactured by Torrance and Sons, of Bitton, near Bristol. In many shops, where large quantities of stone colour and other paints have to be turned out, such a machine would soon repay its cost. As they are light in weight they could easily be moved from job to job.

The paint mixers above mentioned although excellent of their kind, are not quite suitable for mixing



F1G. 2.

very small quantities of paint or colour, and they are also almost too expensive for a small painter's shop. Messrs. Torrance and Sons, Ltd., have, however, recently brought out another mixer, the price of which is only f_2 , and it is admirably adapted for its purpose, mixing the paint very thoroughly and quickly. As shown in Fig. 3, it consists of a conical cup or container resting upon a three jawed stand. The inside of the

container is turned perfectly true, and has a polished surface. Against this surface rolls a heavy pestle or conical roll, which is shown in Fig. 4, suspended by a rod while out of use. The white lead, oil, etc., being placed in the container the pestle is rolled around and gives something akin to a grinding action at the same time that it mixes the solid and liquid together. There is nothing complicated to get out of order, and



F1G. 3.

everything can be wiped clean very easily. The colour being mixed the container is raised by the handles and the contents poured into the paint pot or through strainers ready for use. The author is writing from experience with this mixer, which he has pleasure in strongly recommending, not only to painters, but also to paint manufacturers who can use it to advantage in mixing samples and for other purposes where a larger mixer would entail much more time in cleaning.

Paint Straining.—One of the chief qualities which distinguish painted work done by the amateur from that executed by the qualified workman is in the number of specks or little pieces on the surface of the paint. The amateur seems to think that straining the paint is unnecessary. The workman is fully aware that without it, it is impossible to produce good work. In fact, many painters always strain their



FIG. 4.

paint twice or even three times before they consider it ready for use. They thus remove all the little solid pieces, and are able to give a good uniform surface.

A piece of muslin is often used for this purpose, or a wire gauze strainer may be purchased for a small sum and will last for a considerable length of time. The advantage of this, in addition to its permanence, is that the hard portions of the paint may be beaten against

the gauze, and so the waste be reduced to a minimum.

An excellent shape of paint strainer is that shown in Fig. 5, which is shown in parts in Fig. 6. A repre-

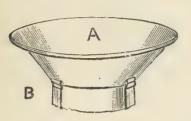


FIG. 5.

sents the body of the strainer, B the clips which hold the compression band, C and D represents the gauze. The advantage of this construction is that the gauze after use may be easily taken out,

cleaned and re-placed. This strainer or its equivalent should form part of the equipment of every

paint shop, large or small.

Another form of paint strainer is used with muslin or coarse cloth, which is held in position by the circular rim, which holds also a plate, having in it large holes. These allow the paint to pass through, but the plate forms

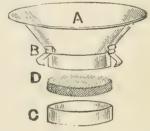


FIG. 6.

a substantial ground for the muslin, and the paint may be worked through with the brush.

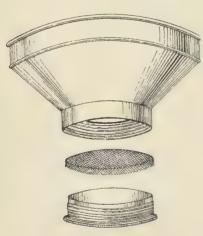


FIG. 7.

Another excellent paint strainer is made by Mr. Tom Batty, F.I.B.D., of Drighlington, near Bradford, Yorks, and is shown in Fig. 7. It will be seen that the essential feature is in a loose strainer which may be removed after use. This strainer is kept securely in position by means of a flange which screws in as clearly indicated in the

drawing. The gauze strainers are supplied in quantities for a trifling sum, and the strainer itself will last for years, thus proving very effective and economical.

CHAPTER II.

COLOURS OR STAINERS.

We come now to a consideration of colours or stainers that have to be used in the mixtures given in the following chapters.

As a rule, one or several colours are added to the base, producing a tint, shade or hue as may be required. Sometimes, but not often, colours are employed as "body colours," that is they are employed just as they are purchased ground in oil, excepting that they are thinned down with the requisite quantity of oil and turpentine and mixed with dryers.

We may now give consideration to actual colour mixture, but must first make one or two points clear, so that the lists which follow may be properly understood.

First, then, it should be said that colours vary in appearance according to the light in which they are viewed. For example, a colour, when looked at in the light of a sunny day in the open, has a very different appearance to that which it presents when viewed in a dark room. This will be explained at greater length further on. The mixtures here given refer principally to oil colours, and it must be clearly understood that the same results will not always be obtained with artists' water colours. In the case of the latter, tints are obtained by the addition of water just as they are produced in oil colours by the addition of white lead or other white pigment. Separate chapters on artists' water colours and water paints or distempers are included.

In examining the lists which follow, the reader may ask why we do not give the actual proportions of the different parts. The answer is that this is impossible for two reasons, the first being that colours vary so largely in quality that the proportions would be useless unless some particular make of colours was taken as a standard, while the second is that the names of the same colour vary also largely. Let us consider this point at once.

The Nomenclature of Colours.—If half-adozen practical painters, experienced in colour mixing, were asked separately to mix a given colour, say a sea green, it is almost certain that when the six colours were compared there would not be two alike. Each of the six painters might have had precisely the same make of colours to work with, and yet the "sea green" would in each case be different. The explanation, of course, is that opinions differ as to what is a "sea

green."

In giving the samples of colour which are contained in this work the author was, under the circumstances, somewhat puzzled to know exactly the right names to give each. His idea as to what was a bronze green, for example, might differ materially from the opinion of others, indeed, as it has already been explained, no two practical men would probably be found to agree as to the exact colour of two or three dozen differently named colours. Under these circumstances, he decided to follow what appeared to be the general rule in the trade. With this object he obtained the colour cards issued by all the leading paint manufacturing firms in the country, as well as some from abroad. He then took the colours which he thought would be most useful to his readers, and then very carefully, and with a considerable amount of labour, compared each colour with similar colours in the different colour cards, taking note of the different names which different manufacturers called them. The result was very surprising, because it was found that in many cases there were as many names as there were manufacturers' cards represented. When, however, the same name was used by several manufacturers, that name was selected for the purpose of this work. The reader may, therefore, take it that the names employed here are those which are most general in the trade. As an instance of the variation of these names we may cite a few examples.

Bronze green was called by different manufacturers dark green, olive green, and sage green. In this case bronze green occurred more frequently than any other name.

Tea green was called also olive green and Queen Anne green.

Apple green was called very light sea green and Eau de Nil green.

Sage green was called also olive and pale Quaker green.

Venetian green was called also Imperial French green, light green, Shamrock green, bright green, mountain green, middle green, and engine green.

Light chocolate was called dark maroon, red lake, metallic brown, and in one case the sample given of burnt sienna was almost identical.

Olive green was called also sage green, deep olive green, and Quaker green.

Dark green was called also medium green, Brunswick green, middle green, and deep coach green.

Moss green some manufacturers evidently thought was the same thing as bronze green.

Pea green was called also sea green and Eau de Nil.
Ivy green was called bronze green, sage green,
Ouaker green, olive green.

Slate was called also Quaker blue and dark lead.
Pearl grey was called also light grey.
Lilac was called also French grey.

Warm grey was called also deep stone, French grey, and light stone.

Silver grey was called also lavender.

Steel grey was called French grey in several instances, but we prefer to use the other term, as it appears to be nearer to what is usually known in this country as a French grey, that is, one which has a touch of red and blue in it.

Another instance of the variation in the names of these colours is shown by light stone, which one would think was sufficiently well known to remove any doubt about it, but this was called smoke grey, French grey, and dove.

Middle stone was called also light drab.

Moss grey was called also silver grey.

Cream was called Manilla, light stone and deep deck.

Dark oak was called also dark drab and yellow bronze green.

Dove colour was called also deep stone.

Colonial yellow was called also straw, light stone, and deep cream.

Deep drab was called also dark stone, light drab, dark drab and fawn; one sample of raw Turkey umber was almost identical.

Dark drab was given also as dark lava and middle drab.

Dark oak was called also copper brown, light oak, and Imperial brown, whilst in one case a sample of dark ochre was almost identical.

Deep cream was called also cream and lemon. Primrose yellow was called also mustard yellow, canary and straw colour.

Straw was called also Naples yellow and deep Naples yellow.

Sandstone was called also dark stone.

Stone colour was called also ecru and light stone. Smoke colour was called rustic drab and drab.

Signal red was called also vermilion, geranium red and poppy red.

Snuff brown was called also light brown, sepia, dark ochre, umber brown and Arabian brown.

Sienna brown was called also teak brown, coffee brown, deep Indian red and terra cotta.

Amber brown was called also bison brown, sepia, and dark oak.

Autumn leaf was called also leather lake, mast colour, middle oak, old gold, and light fawn.

Fawn brown was called light drab and light lava.

Light drab was called also middle drab and doe colour.

Buff in one case was called yellow ochre.

Acorn brown was called also umber, dark oak, dark brown, light brown, dark Indian brown, chestnut brown, middle chocolate, and Portland brown.

With the above instances before him the reader will not, we think, take any exception to the names we have chosen for our sample colours. The same is true concerning the instructions for colour admixture. If a reader makes a mixture according to those instructions and finds the result disappointing, the reason will probably be that his conception of the particular colour differs from that of the author, or it may arise from the fact that the colours used are of inferior quality. And it should be mentioned again, here, that every one of the mixtures has been made in oil colours, checked and checked again.

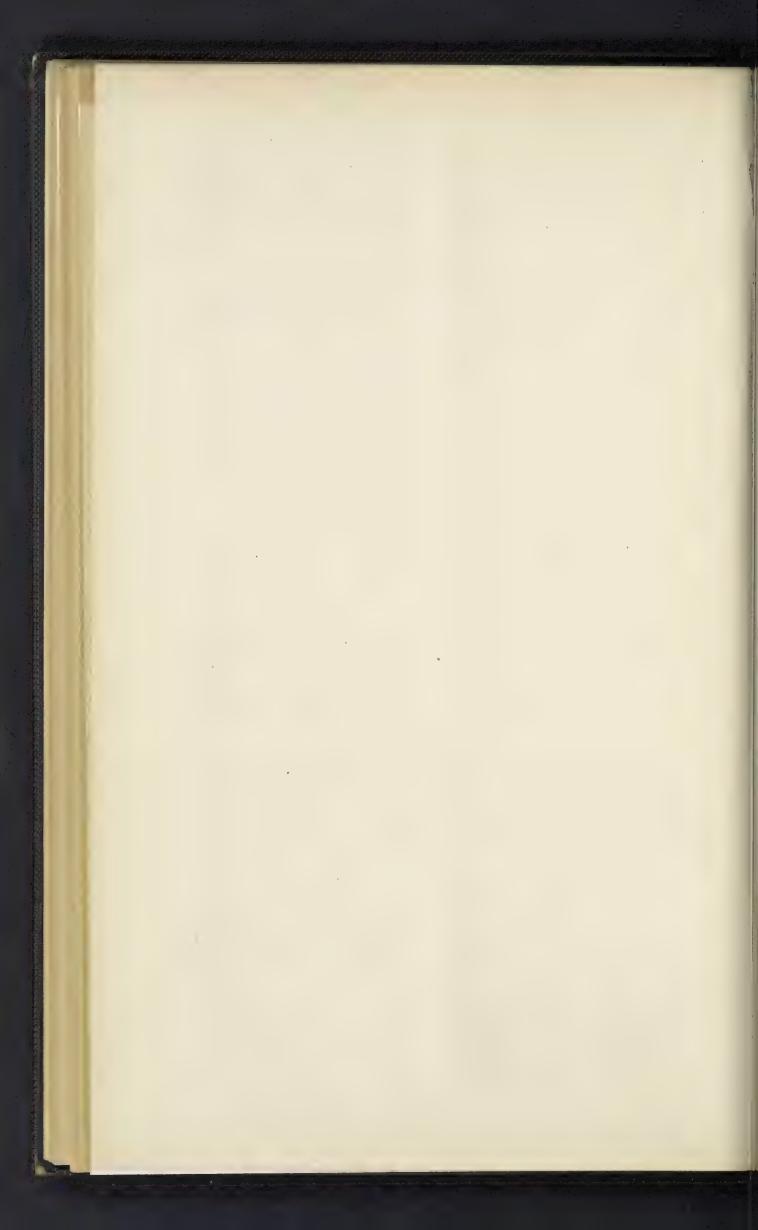
For many years past efforts have been made by scientists and others to formulate a permanent nomenclature for colours, tints, shades, and hues, but it cannot be said that so far any success has been met with. Should the efforts made prove ultimately successful, there is no doubt it would be a great boon to decorators, painters, and others; for example, if a decorator wanted to order from his manufacturer a certain tint or colour, all he would have to do would be to send

in the name. Prang, of Boston, in his work, "The Standard of Colour," endeavoured to systematise the subject, and he did this in the following manner. produced sheets of colour divided up into several hundred squares. On the first sheet at the top was the spectrum of pure colours divided up, and beneath this, similar squares with similar colours, to which had been added a small portion of white. The line below this was the same again with more white added, and so on till the bottom of the sheet was reached, when the colours were greatly reduced by the white, the tints being naturally very light ones. The second sheet was exactly the same as the first, but a small portion of black had been added to all the colours and tints. The third sheet was the same thing again, with more black added, and the fourth sheet more black still, and so on to the end of the work. The colours were distinguished with letters, and the lines indicated the amount of white added by numbers. To anyone who possessed a copy of the work it would be a comparatively easy matter to order any colour from the book by number and letter, but the reader will readily perceive that this work falls short of the requirements of practical decorators, inasmuch as it does not provide for the admixture of different colours, but only those pure colours which are in the spectrum. It is true enough that all colours are as a matter of fact included in the spectrum, but it is not so easy a matter to separate them for practical purposes.

The variation in the names of colours above referred to has proved so inconvenient alike to manufacturers and decorators and other colour users, that an effort was made during 1906 by one leading firm of paint manufacturers to remove the difficulty by standardising sixty of those colours which are most used. With this object, the firm in question offered prizes aggregating f 100, and took a vote of several thousand competitors which included many eminent decorators

PLATE III.





and colourists, besides architects, technical teachers and others. The firm in question was Messrs. Pinchin, Johnson and Company, Ltd., and the plan they adopted in carrying out their competition is worthy of record, because it demonstrates the value of the standard sheet so obtained. They first communicated with some 200 prominent decorators and other colour experts, and from them obtained a list of what was generally considered to be the sixty colours most in use. It may be observed here that there is no reason why sixty colours should have been taken any more than fifty or 100, but, obviously, the work and expense of conducting this competition was very great and it was necessary to decide upon some specific number, and it was felt that sixty colours standardised would mean, at least, a big step in the direction of a general colour nomenclature.

Having then settled as to which sixty colours should be included in their list, they next sent to everyone of the several thousands of competitors four painted samples of each colour or 240 colours in all. They also sent a sheet divided up into small squares, each square being printed with the particular name of the colour that was to be stuck down upon it. The competitor, therefore, was called upon to take any one colour, say sea green, and to select from the four samples of different shades or tints of sea green the one which in his opinion was best entitled to that name. This he stuck on the space allotted for it. He then proceeded to do exactly the same thing with the other fifty-nine colours and then sent the whole sheet to Messrs. Pinchin, Johnson and Company, Ltd. They employed a staff to go through each of these sheets to find out which of the four shades of different colour had received a majority of votes, and in this way evolved the winning shade—sixty of which formed the standard colour card.

The author's acknowledgements are due to the

firm for having supplied him with two coloured sheets, namely, Plates IV. and V., which give the whole of the standard colours. It will be seen by comparing these colours with others which appear in the book that they vary a little in some cases from those of other manufacturers, but it must be remembered that they represent the opinion of the majority of some 3000 experts on the question.

THE ECONOMY OF USING GOOD COLOURS.—It may be taken as a safe rule for the painter to follow that where a good job is required the best materials only should be employed, but the reader may answer to this that the price paid to him for his work will frequently not permit of his doing this. We may leave the subject an open one which has really no place in these pages, except in so far as it relates to tinting colours, and here we can definitely and positively assert that it pays the painter best to use the best qualities of colour, quite irrespective of whether he gets a high price or a low price for his work. explain: Let the reader assume that a large surface is to be painted a very light Prussian blue. price for the work is fixed and the question to be determined is whether it will pay to use cheap Prussian blue or one of high quality. Assume that a high quality blue costs 2s. per pound, and that just one pound of it is sufficient to tint the whole white to the required shade. We are purposely giving a simple case so as to make the matter clear. Now a Prussian blue can be bought for, say, 1s. 3d. a pound, but it would probably consist of at least one half of barytes or some other adulterant, which is of no value whatever as a stainer. If this colour is half strength it is obvious that two pounds of it would be required to tint the white for the work in hand, and this would cost 2s. 6d., against 2s. for the better class colour. This homely example should be taken to heart by every painter. He has only to experiment to find out

that it never pays to use inferior tinting colours. Of course there is another reason why the best quality should be used, and that is, the appearance of the inferior colours is always muddy and unsatisfactory.

HUE, TINT AND SHADE.—There is a good deal of confusion among some painters as to the meaning of the word "hue," "tint," and "shade," although there is no reason why any confusion should exist. word "hue" is often employed to mean practically the same thing as a "colour," but strictly it means the particular cast or individuality, so to speak, of a colour. Thus we talk of a scarlet of a vellowish hue or a crimson of a bluish hue. A colour may consist of any mixture of other colours, or may be a pure colour itself. Now when white is added to any hue or colour a tint of that colour is produced. If black is added a shade of that colour is produced. In the decoration of our rooms we shall see that as an actual fact we obtain shades of the colour by the partial omission of light, because the addition of black as a pigment to a colour acts in the same way as shutting off light. mixing colours it is important to remember that black should not be used to lower the tone of a colour excepting in rare instances. It only has the effect of producing a muddy appearance. A yellow that is too bright can be reduced, or made less staring, a painter might say, by adding a little blue and red. If a blue is too bright a little red and yellow should be added; or if a red is too bright it may be toned down by the addition of a very little blue and yellow. This is a most useful rule to observe, and as long as the quantity of the colours added is not too great, the results will please.

In practice umber is a most useful colour to employ for lowering the brilliancy of a colour, but only a small quantity is necessary for the purpose. If the requisite tone cannot be obtained with a little umber and the mixture is still too bright it may be taken that the proper colours have not been employed and the

mixture should be changed.

The very large range of colours prepared for the use of artists and decorators might lead one to suppose that mixtures of them would not often be required. Of course, as a matter of fact, an artist's palette is usually very restricted and consists of only a dozen or so colours from which he obtains all the tints, hues and shades he requires. Occasionally he may use a little of some additional expensive colour when a special effect is desired.

The same thing is true in regard to the house painter and decorator, with the difference that the cost of colours is much more important to him than it is to the artist, because he uses comparatively such Still, when pure tints are required, large quantities. either rich or subdued, to give a finish to, or produce an unusual effect in, a piece of decoration, it will frequently be found cheapest in the end to procure a tube of some expensive colour than it would be to endeavour to imitate it by an admixture of pigments

of an inferior quality.



CHAPTER III.

HOW TO LEARN TO MIX AND MATCH COLOURS.

The student in colour mixing is advised to put himself through a regular course of experiment or study in order that he may ascertain the peculiar hue or tone of each of the principal stainers in constant use, and also become acquainted with the effect produced by mixing white or other colours.

REDS.

Reds vary from those just removed in hue from browns up to the bright crimsons and madders, having their particular uses. The reader should provide himself with a flat marble slab or piece of plate glass, or indeed any non-absorbent surface to conduct his experiment upon. He should take each of the reds, marked * in the list which follows, or as many of them as he may have, place a very little of them on the slab, each separately, add a little oil and spread them out with a spatula or palette knife. He should then carefully compare each with the other noting the particular hue; then he should add a little white. nearly as possible the same quantity of each case, mix each one separately, and again note the difference. Of course, the spatula must be wiped clean between each mixing, and it is advisable to only mix white with one half of each specimen, so that upon the slab when finished there will be a range of reds and of tints made from those reds.

If the experiments are to be conducted over a wide range of colours, it will be advisable to deal with

them in groups, taking together such colours as Indian red, Tuscan red, Venetian red, etc., and afterwards the other groups, such as the madders and crimsons, and the vermilionettes, etc. It will be found a very good plan indeed to paint each sample on a board with the name and proportion and kind of white used underneath. By dividing up a board into small squares and painting one colour on each, and by having a separate board for each group, a set will be formed

of great value for the purposes of comparison.

To carry the experiment a little further a small portion should be taken and a little black added to it and the tone noted. It will be seen that it gives a muddy cast. Now add a very little blue and yellow, and it will be noticed that the brightness of the original colour is distinctly toned down without lessening the brilliancy of the colour and that the muddy appearance is wholly absent. This teaches at once the important lesson that black unless under very exceptional circumstances should not be added to lower the tone of the colour. It also shows the peculiarities of the different reds.

Facing the title page of this book are a number of samples of pure colours with corresponding samples showing tints of the same colours produced by the addition of white. A week, indeed, a month, may be spent very profitably in experiments with reds alone, indeed, the young man who is learning paint mixing must at the very beginning understand that observation will assist him more completely in attaining success than any possible written instructions can do. The same plan as that above advised can be followed in the case of all other colours.

BLUES.

The two principal blues used by decorators are Prussian blue and ultramarine. The former is practically permanent in oil, but is quite useless in distemper, while the latter cannot be mixed with white lead, but is practically permanent in oil. It may, however, be safely mixed with zinc white, and many beautiful tones are obtained from its use.

There is a wide range of ultramarines on the market, most of them having a tendency in hue toward the violet. Prussian, on the contrary, inclines toward the greys. Experiments with blues may be conducted in exactly the same manner as already explained under the head of "Reds." Ultramarine, Prussian blue, cobalt and indigo being compared, it will be found that indigo is a very useful colour if properly used, if only from the fact that a very little goes a long way. Cobalt is a very beautiful blue, but it is almost too expensive for use in ordinary house painting.

When it is desired to tone a blue down, a little burnt sienna and white should be added.

YELLOWS.

The principal yellows used by the house painter are chromes, which are made in varying intensities. Some makers send out five or six different shades or tints ranging from a deep orange (which might almost be termed red) and gradually ranging lighter up to canary. When white is added to either of these chromes it will be seen that there is a great deal of difference between one shade and another. In other words the lighter chromes may be looked upon as the deeper ones lightened up with white, yet, as a matter of fact this is a very rough and ready way of looking at chromes, because if a deep orange is lightened up with even a hundred or more parts of white, it will be still far from being the same cast of colour as light canary chrome. One is a distinct red cast and the other is a distinct greenish cast. Experiments, therefore, must be continued with the yellows just the same as they have been thrashed out with the other colours, and a couple of hours spent with four or five different grades of chrome will yield valuable information. All chromes

are lead colours and they may not therefore be mixed with ultramarine. Cadmium yellow on the contrary is not affected by ultramarine. This colour, although somewhat expensive, might be used to a considerably

greater extent than it is in house painting.

Dutch pink is another yellow which is useful in distemper work, but is not used so much as it was formerly. Wall paper manufacturers still employ it to a considerable extent. Yellow ochre is a natural earth colour which is very useful, and of course, largely employed. It will be seen in the following list that it occurs in many of the mixtures.

If a yellow is too bright it may be lowered by adding a small quantity of blue and red. Instructions for obtaining the various grades of yellow are given

explicitly in another chapter.

GREENS.

There is, of course, an immense range of greens, and the list below includes, in addition to those which may be purchased ready made, only those which are more or less frequently called for. To obtain a green, one can mix with yellow either blue or black. painter who wishes to experiment should first mix, say, medium chrome yellow with Prussian blue, then with cobalt and then with cobalt or indigo, noting carefully the difference in the hue obtained. It is well to keep the quantity of chrome about the same in each case, so that the difference obtained by the use of the respective blues may be the better appreciated. should then change his yellow, mixing the same proportions as nearly as possible with lemon chrome and then with deep chrome, again noticing the difference in the colours obtained. Having done this he can go back to middle chrome and mix black with it in varying proportions. In this way he will obtain a good deal of practical knowledge in a short time concerning the different shades of green obtainable from these simple mixtures, and he will at the same time not forget the relative costs of the different materials, so that he may learn to obtain desirable mixtures of colour from the least expensive of the pigments. Sometimes a green is obtained simply by lightening up with white a stock commercial green; for example, pea green may easily be obtained by lightening pale Brunswick green. In some cases greens are produced by an admixture of two or more colours, such, for instance, as willow green, which is made from ochre and indigo, and olive green from ochre and French ultramarine. Others have the addition of white, such as grass green, which is white, ochre and cobalt, and spring green, which is white, middle chrome and black.

Having performed the foregoing experiments, the reader should next take up the study of tints and shades. In other words, he should add to the various mixtures obtained in the manner described, different quantities of first white and then black, and notice the effect obtained.

Some colours are very much stronger for tinting purposes than others. For example, a Prussian blue will go a long way and a very little is sufficient to colour a considerable quantity of white lead. The next thing to be done is to add a little black to these colours and to note the result. We must again urge the reader not to use black in reducing his colours as a rule. If it is desired to reduce or lower a yellow in tone use blue and red, if a blue is too vivid add a little red and yellow, and if a red is too bright add a little blue and yellow—in other words, taking the three primaries, add to any one a very little of the other two.

Having experimented in the manner above suggested, the reader will have gained considerable information, particularly as to that most difficult part of colour mixing and matching, which arises from the variation in the strength of different coloured pigments. But it will be necessary to go much farther and to mix various colours one with the other in vary-

ing proportions. Under the head of "Water Colours and How to Mix Them," will be found reference to a colour chart for water colour painting, by Mr. Frederick Oughton. The reader will do well to prepare such a chart in oil colours, and to keep it by him for constant reference. The same colours should, however, not be used as they are mostly too expensive for the house painters' use. The following is suggested: Take a fairly large board and divide it up into say eighteen different spaces, each containing three rows of six each; mark these with the names of any colours on the list of standard colours given in the coloured plates which are thought to be the most important to the number of eighteen. Then turn to the instructions given for mixing these colours, and to give a little dab of each of the pure colours at the top of the space, blending them into the resultant named colour it is desired to produce. For example: Suppose the colour that is to be painted on the first space is myrtle green. We should have a large dab of dark chrome green at the top, by its side a similar dab of ultramarine blue, and by the side of this again a very little white lead. With a brush the three should be blended together to make the myrtle green, still leaving, however, a little of each of the three colours unmixed at the top.

It is unnecessary to give the colours suggested for the other squares, because if the reader has sufficient patience, he might work through every named colour in this book. The point is to give on the same space the actual colour, and below, the colour produced by the admixture. Such as a board or a series of boards should not be merely painted and set aside, but should be kept constantly in sight. A young man anxious to improve himself as rapidly as possible, might do worse than hang such a board upon the walls of his sitting-room, or even bed-room, so that he could see it very frequently, and in this way he would in the

course of time gain much information on points which he would be likely to overlook at the first mixing.

A constant and very careful comparison between the different colours given in our coloured plates of samples will prove of material assistance particularly in the discrimination between oil and water colours, water paints and distempers.

The matching of colours is more difficult than might appear at first sight, and yet a knowledge of it is essential to every decorator. There is no royal road to acquiring a knowledge of the subject, but the reader who works carefully through this book, and acts upon the advice given above, will possess all the necessary foundation upon which to build up a practical knowledge of the subject. The rest will be merely practice.

The first thing to be done in matching a colour is to examine it very closely in the daylight, and endeavour to come to a conclusion as to what the prevailing colour in the mixture is. In other words, to discover what is the particular colour of which there is most in the mixture. If the reader has not lost the lessons which are to be learnt from the experiment he has already conducted, he will not have much difficulty in doing this as a rule.

As a final word on the subject, it may be said the bug-bear of the inexperienced colour matcher is the difference between the intensity of the light by which he views his samples. It has already been explained that a colour varies in its appearance according to whether it is viewed in a strong or subdued light, or whether the light is natural, or gas, electric light, and one may also say whether incandescent or acetylene gas. A great deal of the disappointment which arises in matching colours arises from this very simple cause, and a colour mixed in a bright shop which looks exactly the right shade required, may, when applied to the walls of a somewhat dark room look much too sombre.

If possible, the colour should be mixed in the same room in which it is to be used, and in cases of colours mixed for paint for sale, they should always be mixed in a light workshop, and never on a dull foggy day. It seems almost like carrying the matter too far to say that such a room should have a north light, yet this is very desirable, because if the window has any other aspect, the operations of the colour mixer may, on some fine showery spring day, be considerably hampered by intermittent floods of sunshine.

The student is also recommended to carefully study Plate IX., which will yield considerable useful information concerning the production of different colours in distemper. These colours are all produced by three primary colours and white in the well known distemper Alabastine. These primaries are marked in Plate IX. "A," "B," and "31" respectively, and in the description of the plate will be found the exact proportions of these different colours and white, which may be used to produce all the other colours on the plate. By purchasing even a small quantity of the four grades of blue, yellow, white, and Alabastine red. the student can experiment for himself, measuring the quantities by means of a small vessel, such as a wineglass or cup; indeed, for purely experimental purposes so small a vessel as a thimble would answer. The material is supplied in a powdered form, and the proportions are easily obtained. The writer would like to see in our public schools lessons given as to colour mixtures by the means indicated, and they certainly ought to form a part of the instructions in every painter's school.

CHAPTER IV.

REDS, AND HOW TO MIX THEM.

Having proceeded through a course of study and experiment the student will now require the actual mixtures necessary to produce the various named colours. These are given in this chapter and those immediately following.

Note.—All colours marked * can be purchased ready made.

Acacia.—This may be described as a dark maroon. It is made by mixing five parts of black, three of Indian red, and one of Prussian blue. Less of the black will give a more pleasing shade.

*ALIZARIN CRIMSON.—A lake colour prepared from alizarin or coal tar colours. Alizarin crimson and scarlet are other varieties. They are not so brilliant as genuine madder colours, made from the madder root.

AMARANTHINE.—This is a crimson which can be made by mixing three parts of vermilionette with one of Prussian blue.

ANEMONE.—This is a reddish purple, and may be made by mixing two parts of black, one of white, six of a bright red, and six of Prussian blue.

*Antwerp Crimson.—A fast red of a rich dark hue made by Messrs. Mander Brothers.

APRICOT.—Mix middle chrome yellow with a little vermilion and add a very little lake.

Armenian Red.—Mix one part of yellow ochre with two parts of Venetian red.

AURORE.—A dull pink shade, which can be produced as follows: Mix together one part of Indian red, two of orange chrome, a little lemon chrome, and two of blue, lightening up with white.

BAY.—Mix together three parts of black, three of

Venetian red, and a little orange chrome.

Begonia.—A dark red purple, which may be obtained by mixing four parts of lamp black, five of bright red, and four of Prussian blue.

BLACK MAROON.—Take four parts of black and mix them with one of a bright red and a little Prussian

blue.

BLOOD RED.—Any bright red toned down with a little black will produce a shade sometimes called by this name.

BORDEAUX RED.—Take one part of black and mix with it two parts of orange chrome and one of Prussian blue. Indian red glazed with lake gives the best effect. A colour is made under this name by Messrs. Mander Brothers.

BRICK.—Use two parts of French ochre to one part of Venetian red and one part of white lead, adding more ochre if required to lighten the colour. This gives a good tint, sometimes called "brick red," and is suitable for outside work.

Bright Scarlet.—Mix twenty parts of vermilion, seven parts of pale chrome, and one part of golden ochre. A good vermilionette slightly toned down with yellow answers the same purpose.

Bronze Red.—This is a red toned down with about a fourth part of black, a little bright yellow or

orange being added.

*Brown Madder.—A permanent lake colour made from the madder root. Nearly fast both in oil and water.

*Burnt Carmine and Burnt Lake.—These are two names of the same water colour which is also called "Purple Lake." They are not permanent.

*Burnt Ochre.—Another name for light red; also called "Burnt Roman Ochre."

CAMBRIDGE RED.—Vermilion, to which is added about one twentieth part of Prussian blue, gives a colour sometimes called "Cambridge Red."

*CARMINE.—This colour is usually made from cochineal if it is to be made into a water colour, in which case it is quite fugitive. Carmine, when ground in oil, is usually made from alizarin and is nearly permanent. It is very useful for glazing in order to produce a rich red.

*CARMINETTE.—This is the registered name of an excellent colour manufactured by Messrs. Mander Brothers. It is a bright strong red, which is useful when protected with two coats of varnish. It is of no use, however, for tinting purposes, or in distemper.

CARNATION RED.—Three parts of carmine lake and one part of white lead give a carnation colour, but a better result is obtained by taking pure vermilion as a base and adding carmine and zinc white until the desired rich colour is obtained. This colour is not suitable for use outside.

CARNATION ROSE.—White lead tinted with Indian red or vermilion, or Rubinette, made by Messrs. Goodlass, Wall and Co., Ltd., of Liverpool. A beautiful colour can be obtained by simply tinting white with Lewis Berger's permanent crimson madder.

*Chinese Vermilion.—This is the name usually given to the deepest shade of vermilion.

CHERRY RED.—Mix together crimson lake, burnt sienna and azure blue, or two parts of vermilion and one part of carmine.

CLARET.—Mix two parts of carmine with one of ultramarine blue. A little vermilion may be added if desired, and this may render a little yellow necessary to tone down the colour. A less rich colour may be made by mixing Venetian red and yellow ochre, and glazing with crimson or madder.

CORAL PINK.—This colour is useful only on inside work. It is made by mixing five parts of vermilion, two parts of white lead and one part of chrome yellow. Another recipe for producing shades of coral pink is one part of white, three of red, five of orange, and three of blue.

*Crimson Lake.—A bright red colour made from cochineal (see Carmine). It is used both in oil and

water, but is not permanent.

*Crimson Madder (Permanent).—A beautiful and very useful colour manufactured by Messrs. Lewis Berger and Sons, Ltd., of Homerton, London, and shown on the plate facing title page of this book.

*Dragon's Blood.—A rich, deep red made from the resin of that name. The genuine colour is fugitive and an imitation for use in water only is made by mixing burnt sienna, cochineal, lake and gamboge.

Dregs of Wine.—This shade is produced by mixing Venetian red with a little lamp black and white lead.

EGYPTIAN.—A dull yellowish crimson made by using five parts of black, one and half of white, two of orange, and one of blue, and a very little red.

*Extract of Vermilion.—Another name for

Scarlet Vermilion.

*Fast Maroon.—A speciality of Messrs. Goodlass, Wall and Co. A useful colour for shop fronts, door panels, etc. Very rich in hue, and permanent.

*Fast Red.—A series of bright scarlets usually of the vermilionette type. Messrs. Goodlass, Wall and

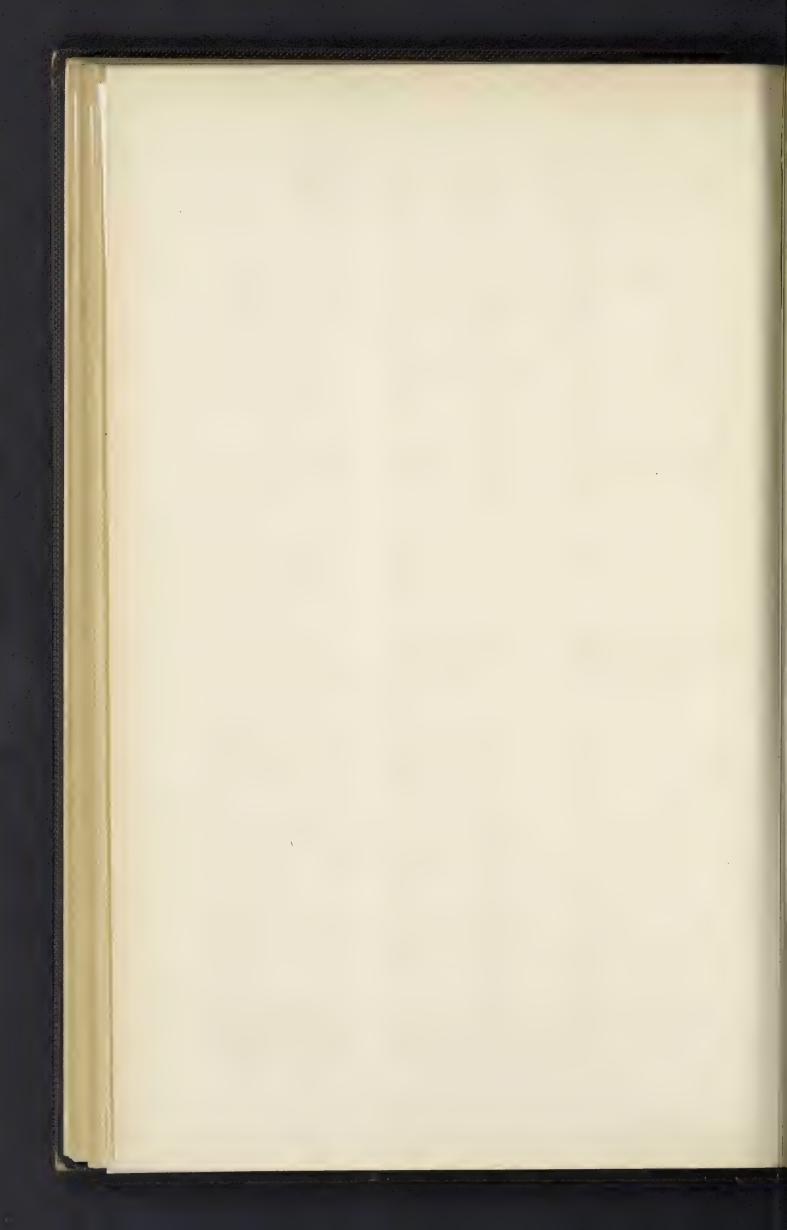
Co. make one of the best known.

*Fire Red.—A brilliant red used instead of deep vermilion, to which it is superior.

FLESH COLOUR.—One hundred and twenty parts white lead, two parts yellow ochre, and one part Venetian red will produce an excellent flesh colour. Or mix eight parts of white lead, two parts of orange chrome yellow, and one part of light Venetian red.

PLATE IV.

57—Standard Burnt Sienna	4-Standard Pearl Grey	14-Standard Light Stone
	1 Orang as David	
26—Standard Old Gold	1—Standard Pink	24—Standard Turquoise
35-STANDARD LT. BRUNSWICK GREEN	29-STANDARD LT. PURPLE BROWN	54—Standard Dark Drab
	Lain was a constitution of the constitution of	
33—Standard Pompeian Red	3-Standard Eau de Nil	48—Standard Light Slate
60—STANDARD DARK LEAD	30—STANDARD BUFF	16—Standard Light Blue
13—Standard Light Indian Red	19—Standard Electric Green	59 — Standard Raw Sienna
39-Standard Mid, Brunswick Green	37—Standard Mid. Purple Brown	52-8tandard Dark Slate
56—STANDARD LIGHT LEAD	18—Standard Middle Stone	12—Standard Lilac
27-STANDARD LIGHT BRONZE GREEN	43—Standard Olive Green	46—STANDARD YELLOW OCHRE
58 - Standard Russet Brown	49—Standard Chocolate	25—STANDARD DEEP INDIAN RED



An increased proportion of red may be employed where desired. A mixture of orange and white in the proportion of one part of the former to three parts of the latter may also be used, or a mixture of medium chrome yellow, ochre, and Venetian red added to white.

FRENCH RED.—Use equal parts of Indian red and vermilion, and glaze with carmine or Berger's permanent crimson madder.

GAZELLE.—To obtain this mix Venetian red, lamp black and Indian red, and add sufficient white lead to produce the desired shade.

*Geranium.—To produce this colour use nine parts of bright red and one of blue. Or Indian red may be used, afterwards glazing with madder lake for good work. Most of the larger colour manufacturers make geranium red which is better than one can obtain by mixing.

INDIAN PINK.—Tint white lead with a little Indian red.

*Indian Red.—This is a good permanent iron oxide pigment and is most useful in mixing with other colours. It is sometimes called "Mars' Red."

*Italian Pink.—An artists' colour, also called "Yellow Carmine," "Yellow Madder," and "Yellow Lake." Not permanent.

*Light Red.—This term might be applied to any tint of red lightened up with white. It is, however, a definite name of a water colour which is also called "Burnt Ochre," "Burnt Roman Ochre," and "Terra Rosa." It is obtained by burning yellow ochre, and is quite permanent. An excellent light red for decorator's use is made by Messrs. Mander Brothers, which may be used for all paint work, including distemper.

LIGHT PINK.—Tint white lead with a little pure vermilion. The word "pink" does not bear any very definite meaning, as almost any bright red such as carmine or crimson added to plenty of white give a good pink just as vermilion does, but of another hue.

A very pretty and useful pink is made by adding white to permanent crimson madder, as shown on the plate

facing the title page of this book.

LIGHT SALMON.—Tint white lead with raw Italian sienna, burnt Italian sienna, and burnt Turkey umber. Or tint white with any bright red, toning down with sienna.

LILAC.—A great deal of difference of opinion exists as to this tint. One part of ultramarine to one part of bright carmine, added to eighty parts white lead, give a very good lilac. A cheaper way is to use Indian red and lamp black as a tinting colour, or rose pink may be added to the lead only. Yet another method for producing a lilac is to mix three parts of bright Indian red, three parts of white lead, and one part of ultramarine blue, but less white lead is preferred by some painters. A touch of yellow will help this colour if too raw for the purpose.

*MADDER LAKE.—This is principally used by artists, but it is useful to the house decorator for glazing the best work where a bright red is required.

MAGENTA.—Carmine and vermilion, with a little

ultramarine blue, produce this colour.

Mahogany Lake.—A pure lake of the maroon character.

*Maroon.—This colour is obtained by mixing carmine and blue black, and adding a small quantity of medium chrome yellow. It may also be made by mixing one part of ultramarine blue with three parts of Tuscan red. This gives a tint that is often considered a little too red, but this defect may easily be remedied by adding more blue. Some painters add ivory black and a little chrome yellow to carmine.

*Markeaton Red.—This well known speciality is a very bright red which lasts as long or longer than vermilion, but is considerably cheaper. It is made by Messrs. Ellam, Jones and Co., of Derby, and is used by many of the big railway companies, Post Office, etc. *Mars' Orange.—Another name for Venetian red, which see.

*Mars' Red.—Another name for Indian red, which see.

MEXICAN RED.—Mix one part of red lead with four parts of Venetian red.

MIKADO.—Three parts of blue and seven of red, mixed with a little white, give this purplish red shade.

MOORISH RED.—Mix together three parts of vermilion and one part of rose pink.

Mulberry.—This is a very dark purple obtained by adding a little blue and just a tinge of red to black.

*New Persian Red.—Messrs. Mander Brothers make a bright red of good body which is sold under this name. It costs only 7d. a lb., and is fairly fast, although it lasts better if protected by a coat of varnish. It must not be used for distemper.

OLD ROSE.—Tint white lead with French ochre, Indian red, and lamp black, or Venetian red and a very little lamp black may be used if desired.

OPAQUE PINK.—Tint white lead with red lead.

OPERA PINK.—Tint white lead with a mixture of five parts of vermilion and one part of medium chrome green.

ORIENTAL RED.—Mix one part of red lead with two parts of Indian red.

Orange Scarlet.—This colour may be obtained by adding two parts of orange lead to one part of white lead.

*Orange Vermilion.—The pale shade of vermilion orange lead comes nearest to this colour. The tone may be made by adding chrome to vermilion.

Peach Bloom.—This is a mixture of white lead and Venetian red. Or it may be produced by adding sufficient Indian red to white lead to give a warm tint and mixing it with equal proportions of white lead, lemon chrome yellow, ultramarine blue and light Indian red. Or a mixture of three parts of Indian

red with seventeen parts of white is sometimes used.

*Persian Red.—A bright scarlet.

PINK.—White lead tinted with orange lead gives a bright pink. See also "Light Pink."

*PINK MADDER.—A lake colour made from the madder root. It is made only in water.

PLUM.—Mix with equal parts of white lead, Indian red and ultramarine blue in the proportion of two parts of lead to one of each of the other colours. This makes a dark plum that is only suitable for inside work. If a light tint is desired add more white lead. A very rich plum may be obtained by mixing together ultramarine blue and carmine, and adding a little white and a little yellow.

*Pompeian Red.—Small quantities of bright red and orange are mixed with black to produce this shade, but Tuscan red tinted with red gives a better

result.

POPPY.—Blue and vermilion mixed in the proportion of one of the former to twenty-four of the latter give this shade. Some colour mixers prefer to add a bright yellow instead of the blue.

Purple.—Light Indian red, four parts; white lead, three parts; ultramarine blue, two parts; or a purple may be obtained by mixing Indian red and white. A mixture preferred by some painters is made by mixing ultramarine and vermilion with a little white. A little crimson lake gives richness to the colour.

*Purple Lake.—A beautiful water colour called also "Burnt Carmine," and "Burnt Lake." It cannot be relied upon to stand light.

*Purple Oxide.—The correct name of purple

brown or dark iron oxide.

RED OCHRE.—This earth colour is cheap, and can be readily bought in most places. It can be imitated by mixing Indian red and chrome and adding a little vermilion.

RED TERRA COTTA.—Use equal proportions of burnt sienna and white lead. The tone may be varied by the addition of either of the umbers and the chromes. A good bright terra cotta is also made by using Venetian red as a base and colouring up with ochre and a touch of lake.

REGAL PURPLE.—Mix together four parts of white lead, two parts of cobalt blue, and one part of carmine lake.

ROAN.—Mix black with half its quantity of red and add a very small proportion of blue and white.

Rose.—Five parts of white lead mixed with two parts of carmine give a rose colour that is suitable for inside work only. An admirable rose colour may be obtained by using zinc white instead of white lead, as the zinc is a much purer white than the lead, and hence gives a purer tint.

Rose Carnation.—Mix together one part of rose madder and eight parts of oxide of zinc. This is a beautiful colour, but the madder is too expensive for use except by artists. A very successful colour can be produced from Lewis Berger's Permanent Crimson Madder.

*Rose Madder.—A lake colour made from the madder root. It is suitable both for oil and water, but is not quite permanent.

ROSE WOOD.—To produce this colour bright red is mixed with about six times the quantity of black and a very little green. The shade given is a very dark red.

ROYAL PINK.—Mix together two parts of zinc white and carmine lake. This will only do for inside work.

*ROYAL PURPLE.—Mix one part of vegetable black, one and half of rich red, and seven of Prussian blue. Some manufacturers make this colour ready for use.

Salmon.—Six parts of white lead, one part of vermilion, and a little lemon chrome yellow. This

mixture produces a colour somewhat bright. Another salmon colour is made by a mixture of raw sienna, burnt sienna, and burnt umber. A tint preferred by some is produced by adding to the white, Venetian red, burnt umber and French ochre. Another method is to add vermilion and golden ochre to white, which gives a nice bright colour. Venetian red and chrome, added to white, gives a duller colour. Still another mixture is Venetian red, vermilion, yellow ochre and white.

*Scarlet Lake.—This colour is manufactured from a mixture of vermilion and alizarin crimson. It is suitable both for oil and water, and is permanent. A colour very similar may be obtained in one of the many vermilionettes on the market. It will be convenient to remember that all vermilions should be lightened by the use of pale chrome instead of white lead. Lead takes down the brilliancy of the colour, producing a pink.

*Scarlet Red.—This is bought ready made. It is the name given to the brightest of the oxide paints.

*Scarlet Madder.—A permanent but rather weak alizarin with which many beautiful tints can be obtained.

SHELL PINK.—This colour is sometimes made by adding a little good Indian red to white, but some decorators prefer to use vermilion with a little chrome yellow and burnt sienna.

Shrimp Pink.—Mix Venetian red, burnt sienna and white lead, and add a little vermilion.

*SIGNAL RED.—This is usually scarlet vermilion, but may be imitated by mixing orange lead, vermilionette and Paris white, or orange lead by itself may be tinted with vermilionette. "Signal Red" is a well known speciality.

Salmon Pink.—Tint white lead with equal parts of orange chrome and vermilion. If zinc white is used instead of lead the colour will be found brighter.

*Sunlight Red.—A specialty of Messrs. Mander Brothers. It is a deep crimson shade, is of good body, fast in light, and suitable for metal or wood signs, shop fronts or work exposed to the light, especially if varnished.

TERRA COTTA.—Mix together two parts of white lead to one part of burnt sienna. One of the best ways to produce a good terra cotta wall is to give a good under coat of white lead, orange chrome and a little Venetian red, and when dry to apply a finished coat made from Venetian red and a little orange chrome to which has been added a little white. See also under "Red Terra Cotta."

*Terra Rosa.—Another name for Light Red, which see.

TURKISH CRESCENT RED.—Mix equal proportions of Indian red, vermilionette and rose pink.

*Tuscan Red.—This can be bought ready made, and may be imitated by mixing ten parts of Indian red with one part English rose pink. Indian red is very similar in colour but somewhat darker. It is also cheap.

VENETIAN PINK.—Tint white lead with a little Venetian red.

*Venetian Red.—This colour is an iron oxide and is sometimes called "Mars' Orange." It is one of the most useful that the house painter has, being cheap, and having good covering power and body. It may be used both in oil and water, and is quite permanent. It is not very good for tinting purposes. It would not, of course, be often imitated, but Indian red—a very similar pigment—could be tinted with red. Or it may be imitated by mixing vermilion, yellow ochre, madder carmine, and a little Cappagh brown, which is an artists' colour, and is rarely used by house painters.

*Vermilion.—This bright red is a mercuric sulphide, *i.e.*, a combination with sulphur and mercury. It cannot be imitated by an admixture of ordinary

pigments, but there are many excellent substitutes on the market, most of them being vermilionettes. The pale variety of vermilion is known also as "Orange Vermilion" and "Pale Vermilion."

*Wagon Red.—Messrs. Mander Brothers make a beautiful colour under this name in two shades, "pale" and "deep." The latter is quite fast in light. Messrs. Manders' Wagon Red is not a vermilionette. It is not intended for distemper.

WINE COLOUR.—Add a little ivory black to a mixture of carmine and vermilion. Or use Indian red mixed with a little black or umber, and glaze with madder. See also the chapter on "Glazing."

*Yellow Lake, Yellow Madder, and Yellow Carmine, are three names given to the artists' colour which is more frequently known as "Italian Pink." It is very fugitive.



CHAPTER VI.

BLUES, AND HOW TO MIX THEM.

Note.—All the colours marked * can be bought ready made.

*Antwerp Blue.—This colour may be described as a weak Prussian blue. It is also called "cyanine blue" and "Leitch blue." If necessary to imitate it, mix one part of bright green with two parts of ultramarine; add a very little zinc or other white, but not lead. Brunswick blue is frequently used in the place of Antwerp blue. It may be used both in oil and water and is nearly permanent.

*Azure Blue.—Also called "new blue" and sometimes used as a synonym of cobalt. To imitate mix one part of ultramarine blue and forty parts of zinc white. Another shade may be obtained by mixing forty-four parts of white, twenty-nine of green, and twenty-seven of blue. Or celestial blue and a little red on a base of white will give an azure shade. Cobalt and white may also be used.

*Berlin Blue.—This is only another name for Prussian blue.

BLUE GRASS TINT.—One part Prussian blue, three parts of emerald green, seven parts of white lead.

*Bremen Blue.—This is a colour to be bought only ready made. It is not now much used, and is not suitable for an oil colour.

*Bronze Blue.—A dark blue colour, which may be made by mixing three parts of black with one of Prussian blue. *Brunswick Blue.—This is bought ready made, and can be imitated by adding white lead to Prussian blue in sufficient quantity to obtain the desired tint.

*Cæurlean.—This is an artist's colour of a light and somewhat greenish blue tone. It is a stannate of cobalt. An imitation may be made from ultramarine and white, with a little yellow, although the colour is a difficult one to imitate successfully.

*Cæruleum.—A colour introduced by Messrs. Rowney and Co. It contains tin (stannic) oxide, cobalt oxide, calcium sulphate, and silicic oxide (silica). It is permanent both in oil and water colour.

CELESTIAL BLUE.—About equal parts of Prussian blue, chrome green and white lead will give this colour, but there should be most white, and the tint should be more blue than green.

*Chinese Blue.—Another name for Prussian blue, which see. Usually the term Chinese blue is applied to a high grade Prussian blue, but sometimes the reverse is the case.

*Cobalt.—This colour is alumina tinctured with oxide of cobalt. It is one of the best artists' colours, and cannot be successfully imitated. It is a beautiful and most useful colour, but unfortunately, it is expensive, and it is therefore only used in the finest work. It is quite permanent, both in oil and water.

*Cyanine Blue.—Another name for Antwerp blue, which see.

DARK BLUE.—Obviously this is no very definite colour. Manufacturers often use one part of white, two of chrome green, and seven of Prussian blue. But ultramarine, or indeed any blue, may be used, and this may be first lightened with white, and black added as may be desired.

Fog Blue.—Equal parts of burnt sienna and Prussian blue, lightened up with about twenty parts of white lead.

*French Blue.—The name is applied to the best quality of artificial ultramarine, which is sometimes termed "French ultramarine." It is permanent both in oil and water.

FORGET-ME-NOT.—This can hardly be termed a name of a colour, although it suggests a clearer idea than many of them. It can be obtained by adding white to cobalt.

GOBELIN BLUE.—Mix together four parts of ivory black, two of white, one of chrome green, and three of Prussian blue.

Granite (Blue).—To produce this shade mix two parts of black with six of white and one of ultramarine blue.

HELIOTROPE.—This colour is obtained by using two parts of zinc white, three of bright red, and four of ultramarine blue.

IMPLEMENT BLUE.—This is made simply by mixing ultramarine with white. Barytes and zinc mixed are frequently used for the white, as lead cannot be employed in the presence of ultramarine.

*Indigo.—This dark blue is a natural vegetable pigment, being extracted from the Indigo plant. An imitation may be produced by using nine parts of black and four of Prussian blue, but this will not look like the real thing. Indigo should not be mixed with lead or lead chromates. It is, however, a very useful colour although not quite permanent, especially in oil.

LAVENDER.—Three parts of ultramarine blue and one part of carmine, added to zinc as a base, give a very good lavender tint for inside work. Ivory black mixed with a little carmine and ultramarine and added to white lead may be employed for outside work.

*Leitch Blue.—Another name for Antwerp Blue, which see.

LIGHT BLUE.—This is simply an ultramarine blue tint produced by the addition of zinc; or the colour

may be obtained by tinting white lead with Prussian blue.

*Lime Blue.—This is a colour much used formerly for mixing distemper, but artificial ultramarine has to a great extent supplanted it. It must not be used in oil. The colour usually sold for lime blue is a variety of ultramarine.

MARINE BLUE.—A very dark blue, which is obtained by mixing one part of ultramarine blue with nine of ivory black.

MASCOT.—This is a very dark blue shade, which s got by mixing black and blue in the proportion of seven parts of the former to one of the latter with a

very little green.

*Mauve.—Is made from aniline, and is not permanent either in oil or water. Four parts of cobalt blue, twelve parts of oxide of zinc, and one part of carmine lake give an excellent mauve, or the colour may be obtained by mixing yellow ochre, blue black, and Venetian red with a little white lead. Another shade is obtained with blue, red and white mixed in the following proportions: blue, three parts; white, two parts; red, one part. Or white may be tinted with ivory black, carmine and ultramarine.

METHYL BLUE.—Mix green with twelve times its

quantity of blue and a touch of red.

MOUNTAIN BLUE.—One part of ivory black, two parts of rose madder, three parts of cobalt blue, and four parts of white lead. This colour is only intended or artists' use.

NAVY BLUE.—Ivory or drop black mixed with one-fourth the quantity of blue will give this shade.

NEUTRAL BLUE.—A series of neutral blues may be made by tinting white lead with Prussian blue and adding burnt umber, the quantity of blue and umber being varied according to the tint required. Good neutral blues may also be made by tinting white with raw umber and a little Prussian blue. Add either a

little burnt sienna if a warm neutral blue is required, or a little black if one cool in appearance is desired.

*New Blue.—Another name for azure blue, which see.

NILE BLUE.—Mix a little white with Prussian blue and chrome green, using rather less of the latter than the former. The result is a pale greenish blue.

NORMANDY BLUE.—To get this greenish blue shade mix green and blue in about equal proportions with white.

ORIENTAL BLUE.—One part of lemon chrome yellow, two parts of Prussian blue and twenty parts of white lead.

Peacock Blue.—This colour is one upon which opinion varies considerably. A splendid colour is made by taking cobalt as a base and adding a little white and a little Chinese blue.

*Perfect Blue.—Some manufacturers produce this beautifully rich colour. It is very like cobalt, but slightly darker.

*Permanent Blue.—A pale variety of the best quality of French (artificial) ultramarine.

Pompeian Blue.—This is made by tinting white with ultramarine and adding a little vermilion and Italian ochre.

PORCELAIN BLUE.—To get this shade mix one part of zinc white and chrome green with four parts of ultramarine blue and a touch of black.

*Prussian Blue.—This colour is certainly the most important blue the house painter has. It cannot be imitated. It works well in both water and oil, and is transparent. It is very strong and care must be exercised in using it lest too great a quantity is added to a batch of paint, which might be spoilt in consequence. It is a ferro-cyanide of iron obtained by mixing together solutions of a ferric salt and an alkaline ferro-cyanide. Prussian blue is also called

"Chinese blue." It is not quite permanent, and must not be used in distemper.

QUAKER BLUE.—Add a little black to Prussian

blue, and lighten up with white.

ROBIN'S EGG BLUE.—Use white for base, tint with ultramarine until a fairly strong blue is obtained, and

then tinge with a little lemon chrome green.

*ROYAL BLUE.—This is made by adding a little white to Prussian blue with a touch of crimson lake. Some manufacturers make a very rich blue, which they sell under the name of Royal blue.

SAPPHIRE BLUE.—One part of Chinese blue mixed with double the quantity of oxide of zinc. This should not be used for outside work.

SEA BLUE.—Two parts of Prussian blue, three

parts of raw sienna, thirty parts white.

Sky Blue.—This is the blue sold as "new blue." To imitate one part of Prussian blue added to one hundred and twenty parts of white lead give a sky blue, but some prefer cobalt, and this is for many purposes doubtless the best. Still another method of obtaining sky blue is to tint white lead with a little lime blue, adding a very little middle chrome, but the latter is more suitable for a distemper colour than it is for an oil paint, as lime blue is not very lasting in oil.

STEEL BLUE.—Zinc white tinted with lime blue

gives this colour for distemper.

Stone Blue.—One part of raw umber, twice the quantity of Prussian blue on a base of white lead will give this colour.

TRANSPARENT VIOLET.—Mix together four parts of ultramarine blue and one part of crimson lake. This is suitable only for artists' use.

Torquoise Blue.—Two parts of cobalt blue, one part of emerald green, twelve parts of white lead.

*ULTRAMARINE (ARTIFICIAL).—This is one of the chief blues used by the painter, and must be bought ready made. It is quite permanent, both in oil and

water, and cannot be imitated, but it can be bought in many different qualities and shades, such as purple, cobalt, etc. It must not be mixed with chromes or white lead, as it contains sulphur, and there would on that account be a likelihood of discolouration. Natural ultramarine is very expensive. It is made from selected parts of the mineral *lapis lazuli*.

*Ultramarine Ash.—An expensive artists' colour made in the same way as genuine ultramarine, but of a paler shade, owing to the larger proportion of stone allowed to remain.

*Verona Blue.—This beautiful colour is manufactured by Messrs. Lewis Berger and Sons, Ltd., of Homerton, London, and is most useful for high class decoration.



CHAPTER VI.

YELLOWS, AND HOW TO MIX THEM.

Note.—All the colours marked * can be bought ready made.

ALABASTER.—This is a yellowish white in colour. Mix four parts of white with one of middle chrome yellow.

*ALIZARIN YELLOW.—A comparatively new yellow

lake made from the coal tar colours.

AMBER.—An imitation of amber can be produced by mixing equal portions of burnt sienna, burnt umber, blue black and orange chrome yellow, and adding a quantity of white lead until the desired tint is obtained.

Antique Bronze.—Add ivory black to orange chrome yellow in the proportion of about five parts of black and one part of orange.

ASIATIC BRONZE.—One part medium chrome yellow, two parts raw umber, and lighten with white lead.

*Aureolin.—An artist's water colour, often termed "cobalt yellow." It is a double nitrate of cobalt and potassium and was originally introduced

by Messrs. Winsor and Newton.

*Aurora Yellow.—A speciality of Messrs. Winsor and Newton, introduced by them in 1889. It is an opaque and brilliant variety of sulphide of cadmium of greater body than ordinary cadmiums and a much better drier. It is as bright as the best chrome, but is quite permanent.

PLATE V.





BISCUIT COLOUR.—The purest tints may be obtained by tinting zinc oxide with Naples yellow. Ochre added to white with a touch of umber may be used.

Brass Yellow.—This may be obtained by mixing forty parts of white lead, twelve parts of light chrome yellow, one part raw umber, and one part burnt umber. Or a mixture of French ochre and medium chrome yellow, added to a little umber, with a touch of blue, may be used to tint white as a base.

Bronze.—Take fourteen parts of black and add one part of yellow and two of green. See also under "Green."

Bronze Yellow.—Mix together five parts of medium chrome yellow, three parts of white lead, and one part of raw umber. A mixture preferred by some painters is obtained from chrome yellow, French ochre and a little burnt umber.

Buff.—Two parts of white lead and one part of yellow ochre produces a good buff, or white lead may be tinted with French ochre alone. Other shades are obtained with mixtures of two parts of black, four of white, one of red, and one and one-eighth of yellow.

BUTTERCUP.—White lead tinted with lemon chrome gives a nice buttercup yellow.

*Cadmium Yellow.—This is an artist's colour of considerable value, but is, generally speaking, too expensive for house painters. It should not be mixed with chrome yellow, emerald green, or any pigment containing copper or lead, and tints should therefore be obtained by using zinc oxide. It is made in four shades: pale, medium, deep, and orange, and it cannot be successfully imitated. The palest shade is sometimes called "Radiant yellow." Cadmium yellow is sulphide of cadmium and is quite permanent in oil and nearly so in water.

CANARY.—This is practically another name for straw tint, and it may be mixed in the same way. The proportions for an ordinary shade of canary are three parts of lemon chrome yellow to one part of white lead, but less yellow is often preferred. Another shade is obtained by mixing two parts of white, six of yellow and two of green. Some manufacturers make an extra light chrome yellow which they call by this name.

CHAMOIS.—A dull yellow made by mixing four parts of white, five of yellow ochre and one of green. *CHINESE ORANGE.—Another name for Alizarin

orange.

CHAMOLINE. — Mix together five parts of white lead, three parts of raw sienna and one part of lemon yellow.

CITRINE.—Although this is a tertiary colour, and theoretically can be made from green and orange, opinions as to the exact shade somewhat differ. may be made by mixing four parts of medium chrome yellow and one part of raw umber; or five parts of lemon chrome yellow and two parts of raw umber.

CITRON.—To produce this colour use Venetian red as a base and add one part of Prussian blue, two

of chrome yellow and two of white.

*CITRON YELLOW. This is strictly zinc chrome or lemon yellow, but the name is sometimes used for chrome yellow (pale), which see.

*COBALT YELLOW.—Another name for aureolin,

which see.

COLONIAL YELLOW.—Medium chrome yellow mixed with white lead and a little dark orange chrome

yellow gives this tint.

CREAM.—The best and purest tints of cream are obtained by tinting zinc oxide with a little Naples yellow. A good shade is obtained by mixing eight parts of white lead, two parts of French yellow ochre and a touch of Venetian red. French ochre and lead alone are often employed. Equal parts of raw sienna and orange chrome used to tint white gives a nice cream. There are many other methods of obtaining this tint. *Note.*—Light buff, medium buff and dark buff may all be obtained in the same way by adding more or less of the French ochre or white.

*Chrome Yellow.—Normal chromate of lead produced by precipitation. These yellows are cheap and very useful to the house painter, but although permanent in sunlight they darken when exposed to pure air. There are five different shades known as primrose, lemon, middle, orange and scarlet chrome. The latter is sometimes called orange chrome, deep.

DAFFODIL.—Lemon chrome mixed with a little Venetian red will give this colour.

*Daffodil Yellow.—This name is sometimes given to the palest tint of cadmium yellow.

DEEP CREAM.—This colour is made by tinting white lead with yellow ochre and a little Venetian red. (See Cream.)

ECRU.—Tint white lead with French ochre and medium chrome yellow. A tint which is sometimes called stone colour is produced in the same way. Another shade of ecru may be obtained by mixing three parts of black, eight parts of white, three of medium chrome yellow, and one of Brunswick green.

*Gamboge.—This is an artist's colour. It is a gum resin, is somewhat fugitive, and is useless for the purpose of the house painter. A preparation called "Gamboge" is ground in oil, but it is an alizarin yellow.

Gold.—To obtain the colour known as "gold," white lead may be tinted with five parts of golden or yellow ochre and one part of vermilion, or a mixture of light chrome yellow, French ochre and vermilion may be used instead to tint the white lead. The quantity of yellow used should be considerably more than the ochre.

*Gold Ochre.—Another name for Roman ochre.

HAY COLOUR.—French ochre, medium chrome yellow, and lamp black used as tinting colour for white lead will give a hay colour, or raw Italian sienna and lamp black may be employed if desired.

*Indian Yellow.—A rich yellow made from "purree," the dung of camels, etc. It is chemically a magnesium salt, and if properly prepared by repeated washings is practically permanent. It is permanent both in oil and water.

*Italian Lake.—A colour made from quercitron bark. Also called Italian pink, yellow madder, or

yellow carmine. It is not permanent.

Ivory.—Varying tints of ivory are best obtained by tinting zinc oxide with Naples yellow. The addition of a very little medium chrome yellow to white lead also produces an ivory or a very little golden ochre may be used. Another way is to tint white very slightly with middle chrome and a touch of black.

Jonquil Yellow.—Tint white lead with medium chrome yellow to which has been added a very little vermilion red. One of the favourite methods is to employ sixteen parts white lead, one part of indigo and two parts of light red, adding as much chrome yellow as may be desired. Another way of making jonquil yellow is by simply mixing with a little green about forty times the quantity of yellow.

*Kings Yellow.—This was formerly arsenious sulphide, but as that colour fades so rapidly pale

chrome yellow is usually employed.

LEGHORN.—This is a pale yellow shade, which is obtained by mixing white and medium chrome yellow

in about equal proportions.

Lemon.—For this colour, lemon chrome yellow is used alone, but the tint may be made by using white lead for a base and adding medium chrome yellow until the desired tint is obtained. The tint that is usually preferred is obtained by mixing five parts of

chrome to two parts of white lead, and adding a little green. However, lemon chrome yellow purchased ready made is the best. In artists' colours a lemon yellow is made which is also called "strontium yellow," and sometimes "yellow ultramarine."

LIGHT BUFF.—A little vellow ochre added to white lead gives a good buff colour, the tint varying with the

quantity of ochre.

LIGHT DECK.—This colour may be produced by mixing medium and lemon chrome yellow with white.

LIGHT STONE.—Tint white lead with French ochre

and lamp black.

*Lemon Chrome.—This is the palest shade of lemon chrome yellow. Some makers produce a still lighter shade which they designate "canary chrome." It is very useful for preparing the lighter shades of yellow, and may be imitated by adding cadmium yellow to zinc white.

*Lemon Yellow.—Is also called "Barium Yellow," and is a preparation of Chromate of Barium. In the deeper shades a little chromate of strontium is often used. The pale variety is also called yellow ultramarine or permanent yellow. Care should be taken to distinguish between lemon yellow and yellow chrome. Pure lemon vellow is permanent both in oil and water.

Maize.—Mix yellow and white in the proportion of about three parts of the former to one of the latter to get this light yellow shade.

*Mander's Yellow.—This is intended to be used as a substitute for old Oxford ochre, but is claimed to be superior. It is based on ochre and is of great

strength and body.

Manilla.—This colour is sometimes called "deep deck." It is made by tinting white lead with French ochre and chrome yellow. Or a mixture of white with four times the quantity of yellow will produce a shade of manilla.

MARIGOLD.—This is obtained by mixing a very little bright yellow with orange chrome.

*Mars Yellow.—Another name for Roman ochre, which see. It is quite permanent, both in water and oil.

Melon.—Mix equal quantities of black and white. Add twice the bulk of orange chrome and a quantity of medium chrome equal to the mixture of black and white.

Mushroom.—A dull yellow shade, which may be obtained by adding one part of orange and two of yellow to eight parts of black.

MIDDLE STONE.—Mix as described under "Stone," but use more umber and ochre.

*Naples Yellow.—A permanent yellow made from an admixture of oxide of zinc and cadmium yellow. In oil colours it may be imitated by mixing lead or zinc with cadmium and adding a little ochre. Naples yellow, when mixed with varying proportions of zinc oxide, yields pure tints of cream, ivory and biscuit.

NEUTRAL ORANGE.—A water colour made from a mixture of cadmium yellow and Venetian or light red.

OLD GOLD.—Use middle chrome with a little vermilion and burnt sienna, and add a very little cobalt. A cheaper colour may be made by mixing ochre and burnt sienna. One part of green and three of bright yellow mixed with a little white will give an old gold shade. Or it may be obtained in the same way as "Gold" (which see), but a little burnt umber may be added. Some painters prefer to tint white lead with a mixture of chrome, raw sienna and vermilion. White tinted with a little orange chrome and burnt umber also gives a good old gold tint.

OLIVE YELLOW.—This colour is sometimes called olive brown. It is made by mixing three parts of burnt umber with one part of lemon chrome yellow,

a larger quantity of yellow being added if a lighter shade is required. Another method is to mix ten parts of black, one of orange, twelve of yellow, and five of green.

Orange.—Mix white, yellow and orange in the following proportions: one part each of yellow and white and eighteen parts of orange. Or another shade is got with seventeen parts of orange, six of yellow and two of white. Orange chrome yellow can be easily purchased, however, and gives this colour without any admixture being necessary.

*Orpiment.—Another name for pale chrome yellow.

*Oxford Ochre.—Another name for yellow ochre but usually applied to a good grade.

*Permanent Yellow.—Another name for lemon vellow (pale), which see.

Persian Orange.—Mix fourteen parts of orange chrome, five parts of yellow ochre and one of white.

POMPEIAN YELLOW.—Tint white with Italian ochre and add a very little ultramarine and vermilion.

PORTLAND STONE.—Mix equal parts of yellow ochre and raw umber, and lighten up with white until the desired tint is obtained.

*Primrose Yellow.—Lemon chrome used by itself answers admirably. Another variety is called "citron yellow."

PRIMROSE.—Ten parts of white, three parts of green and four parts of yellow will give this light greenish yellow. Another shade is got by mixing one part of orange, two parts of green and five parts of yellow.

*Radiant Yellow.—Another name for pale

cadmium yellow.

*Roman Ochre.—A bright coloured ochre often called "gold ochre" and sometimes "Mars yellow." It is quite permanent, both in oil and water.

Spruce Yellow.—Add a little Venetian red to a mixture of French ochre and white lead.

Stone.—This colour, so much used in London, is usually made by mixing together five parts of white lead, two parts of French yellow ochre and one part of burnt umber. By adding a little raw umber, the tint may be varied as desired. This colour is suitable for outside work. Another method for obtaining the shade is to tint white with medium chrome yellow and burnt umber.

STRAW COLOUR.—Lemon chrome mixed with raw umber.

STRAW. — White lead tinted with a little chrome yellow produces an excellent straw tint, but some prefer to add a little French ochre. Or medium chrome yellow may be used as a base, and a mixture added of white, French ochre and Venetian red.

*Strontium Yellow.—A name given to the deepest shade of lemon yellow.

*Yellow Lake.—This is a very fugitive colour which has but little body, but is useful for glazing. It is also called "Italian lake," "yellow madder," and "yellow carmine." To imitate it use equal parts of burnt umber and white lead and tint with chrome yellow and lake. Or mix umber and white in equal proportions and add Naples yellow and scarlet lake. To obtain this colour in its full richness it is quite necessary to glaze either admixture with yellow lake.

*Yellow Ochre.—The ochres are natural mineral pigments, consisting of clay and ferric earth, which are among the cheapest and most useful at the command of house painters. They can be used in any vehicle and are quite permanent, while they do not affect any other colour with which they may be used. Oxford ochre is generally accepted to be the brightest of the series, while it is distinguished also for the depth of its covering power.

*YELLOW ULTRAMARINE.—Another name for lemon yellow (pale), which see.

*ZINC YELLOW.—This is a chromate of zinc which is quite fast in light, and possesses the advantage of permanence even in the presence of impure air, sulphuretted hydrogen, etc. It may be mixed with other colours, without adversely affecting them. It is also known as "zinc chrome" and "citron yellow."



CHAPTER VIII.

GREENS, AND HOW TO MIX THEM.

Note.—The greens marked * in the following list may be purchased ready made.

*ALIZARIN GREEN.—This series of greens is manufactured from the coal tar colours and may be regarded as lakes. They are practically permanent, and take the place of sap green, Hooker's green, and Prussian green.

Aloes.—A pale sage green shade. To obtain it mix six parts of black, three of white, one of chrome

yellow, and three of Brunswick green.

APPLE GREEN.—The simplest way to obtain this is to mix medium chrome green with about thirty times the quantity of white lead, but other greens may be employed with the addition of a little Prussian blue when necessary. Or a little orange chrome yellow may be added to the medium chrome green and white lead. A very good shade can be produced by mixing one part of white with four of yellow and nine of green.

AUTUMN GREEN.—Mix one part of chrome yellow

with seven of black and two of emerald green.

*BICE.—A water colour called also "Green Lake."

BLUE GREEN.—Equal proportions of deep chrome green and cobalt, or three parts of chrome green and one of Prussian blue, added to white lead in the proportion of about four times the quantity of lead to the mixture of green and blue, will give a tint which is sometimes called "Blue Green."

BOTTLE GREEN.—Mix together five parts of medium chrome green and one part of blue black. A similar colour may be obtained by adding Prussian blue to blue black and lemon chrome. Another shade is made by using four parts of black and one of green.

*Bronze.—A water colour made of a mixture of chrome greens.

Bronze Green.—The usual method is to mix black with chrome yellow (deep), but indigo may be used instead if desired. A much brighter colour is obtained by a mixture of medium chrome yellow, Prussian blue, and burnt sienna. Or the following recipe may be used: Middle chrome green, five parts; blue black, one part, burnt umber, one part. A light bronze colour may be obtained by adding more green or by using light instead of medium green. Other shades of bronze green may be got by adding a little lamp black to dark chrome green, or by taking medium chrome green and adding lamp black and a little raw umber.

*Brunswick Green.—This colour is sold in three shades. It may be imitated by a mixture of Prussian blue and chrome yellow. Chrome green is really the same colour, the latter being the name used by artists' colourmen.

*Cobalt Green.—A useful, permanent colour manufactured by tinting oxide of zinc with oxide of cobalt. It is permanent both in water and oil.

CHARTREUSE.—This is a light yellowish green colour. Mix four of chrome yellow and five of chrome green, lightening up with white.

*Chrome Green.—This colour is bought ready made, and is by no means permanent. It is not suitable as a water colour. To produce it by admixture, add Prussian blue to lemon chrome yellow in the proportion of about one part of blue to eight parts of yellow.

*CHROMIUM OXIDE.—This is a beautiful, rich and

permanent green of an emerald green hue. Chemically, it is a sesquioxide of chromium. It is an artist's colour.

*CINNABAR GREEN.—Similar in composition to chrome green, but darker, owing to a deeper variety of chrome yellow being employed. It is not used in water, and is not quite permanent in oil.

EAU DE NIL.—Tint white lead with medium chrome yellow, emerald green and a touch of Prussian blue.

EGYPTIAN GREEN.—Add two parts of raw umber and one part of lemon pale yellow to white lead. Give the green tone to it by means of a little Prussian blue.

ELEPHANT GREEN.—A dark green, obtained by adding emerald green to black.

ELECTRIC GREEN.—Mix blue black and lemon chrome, add a little cobalt and lighten up with white. Another method is to use emerald tint, and to add a little blue to it. Usually, the term is a very vague one, and is applied to almost any greenish blue.

*EMERALD GREEN.—This beautiful, bright green cannot be successfully imitated. It must not be mixed with ultramarine. The pigment is chemically an acetoarsenite of copper, is a great favourite with some painters, while others never use it. In America, the pigment is known as "Paris green," but it is not there used to any extent by painters, although it is used In the absence of the real thing, as an insecticide. more or less presentable imitation may be obtained by mixing eight parts of white lead and one part of medium chrome green, or a light shade of chrome green may be used without lead. Emerald green, although so bright, has very little body, but it is very useful for glazing, i.e., a thin finishing coat is given over a good green ground to brighten it. Very near imitations of emerald green are made by most colour houses,

and are sold under various names such as emerald tinted green, emerald tint green, etc. They are not, however, suitable for distemper. Emerald green stands better in oil than it does in water.

FOLIAGE GREEN.—One part of blue black may be mixed with four parts of lemon chrome. Use medium chrome yellow if a darker shade is required.

French Green.—This is a bright yellowish green, which may be obtained by adding to emerald or deep chrome green about one-tenth part chrome yellow. Yellow ochre is sometimes used instead.

GAGE GREEN.—This is a variety of sage green. It may be made in the same way as pea green, and when this is reached a little black should be added to bring it to the required sage colour.

*Genuine Green.—This is usually to be had ready mixed, but it varies considerably in name as well as in the exact tint. It comes very near to what some manufacturers call "Deep Royal Green," while it is not far removed from an olive.

GRASS GREEN.—The colour sold as "extra light chrome green" makes a splendid grass green without any addition, but if it is not available, lighten up medium or dark chrome green with chrome yellow.

**GREEN BICE.—See Bice.

Green Slate.—Tint white lead with a bright green toned down with ochre and lamp black.

*Green Lake.—A water colour also called "Green Bice."

Green Stone.—Twelve parts of white lead tinted with one part medium chrome green and one part of raw umber give this tint, or the tinting colours may be French ochre and emerald green with a little lamp black.

GREY GREEN.—Use ultramarine blue, lemon chrome yellow, blue black and white lead.

*Guignet's Green.—Another name for Viridian, which see.

*Hooker's Green.—An artist's colour made in three or more beautiful shades and called also "Alizarin Green." Originally Hooker's green was made from an admixture of pigments, but its fugitive character has led to the alizarin being substituted by some firms.

*HOLLY GREEN.—A useful colour made by Messrs.

Thomas Fewster and Son, Ltd., of Hull.

Invisible Green.—A dark green made by mixing nine parts of black and one of bright green.

IVY GREEN.—This is produced by a mixture of

French ochre, lamp black and Prussian blue.

LEAF BUD.—This colour is suitable for inside work. It is made by mixing orange chrome yellow, light chrome green and white lead in equal proportions.

LIGHT GREEN.—Equal quantities of white and blue and rather more than twice the amount of green

give a very good shade.

LIGHT OLIVE GREEN.—Mix three parts of middle chrome, two parts of black, and one part of burnt sienna and lighten up with white lead until the desired colour is obtained.

*LIME GREEN.—This is a very fast colour which is bought ready for use, and is only suitable for distemper, etc. It cannot be used with oil.

*Malachite Green.—A prepared native carbon-

ate of copper.

Manse Green.—This is produced from a mixture of a bright green, medium chrome yellow and French ochre.

MARINE GREEN.—Mix one part of middle chrome green with four of black.

Medium.—A green of this name may be purchased ready made. It is very similar to middle Brunswick green.

MIGNONETTE.—This is a dark green shade, obtained by mixing one part of chrome yellow and one of Prussian blue with three parts of chrome green and fifteen parts of black.

Muscovite.—This is a dark sage yellow greenish shade. It may be obtained by mixing six parts of Prussian blue, thirteen of chrome green, three of orange chrome, eight of white, and twenty of black.

Moss Green.—Tint white lead with French ochre, a bright green and a little lamp black.

Moss Rose.—This pale greenish shade is obtained by mixing chrome or Brunswick green, bright yellow and white in the proportions of one part green, four of yellow and three of white.

MOUNTAIN GREEN.—Add to medium chrome yellow sufficient cobalt to produce the desired hue, adding a little white if necessary.

MYRTLE.—Three parts of dark chrome green, one part of ultramarine blue, and a little white lead will give an excellent myrtle colour.

NIGHT GREEN.—Seven parts of chrome green and three parts of yellow ochre will give this shade.

NILE GREEN.—Five parts of white, nine of emerald green and six of Prussian blue will give this shade. This may also be mixed in the manner described in "Eau de Nil."

OLIVE.—Mix together ten parts of lemon chrome yellow, one part of ultramarine blue and one part of light Indian red. Another method is to use eight parts of lemon chrome yellow, one part of blue black, and one part of Prussian blue. Or the following proportions give very good shades: Three parts black, four parts white, four parts red, two parts yellow, and eleven parts green; or, fifteen parts of white, twenty of red, twelve of yellow, and fifty-three of green. Some painters add equal portions of Prussian blue and lamp black to lemon chrome yellow for a base, or the base may be ochre instead of chrome, and a little of the yellow be added.

*Olive Green.—The colour sold under this name is made from quercitron lake and ultramarine. In

water colour it consists of a combination of Indian yellow, umber and indigo.

*OLIVE LAKE.—An artist's colour more familiarly known as "Sap green," and sometimes "Olive green."

ORIENTAL GREEN.—Is made by mixing equal proportions of raw umber and lemon chrome yellow.

Peacock Green.—A mixture of seven parts of white, fifty parts of emerald green and forty-three of Prussian blue will give this shade. A little yellow is sometimes added. The colour is best produced by giving a final transparent coat over a ground colour. For the ground mix a rich green, a very deep Brunswick green and middle chrome. Over this apply a very thin coat of a deep bluish green made from Prussian blue and lemon chrome.

PEA GREEN.—Forty-eight parts of white lead and one part of chrome green will give this colour, or emerald green may be used if desired. Some makers mix medium chrome green and white lead in the proportion of five parts of the latter to one part of the former to obtain a pea green, but the proportions may be varied according to the exact shade required.

Persian Green.—This is only another name for emerald green, the vivid and somewhat staring hue being sometimes employed in Oriental decorations and being then termed "Persian green."

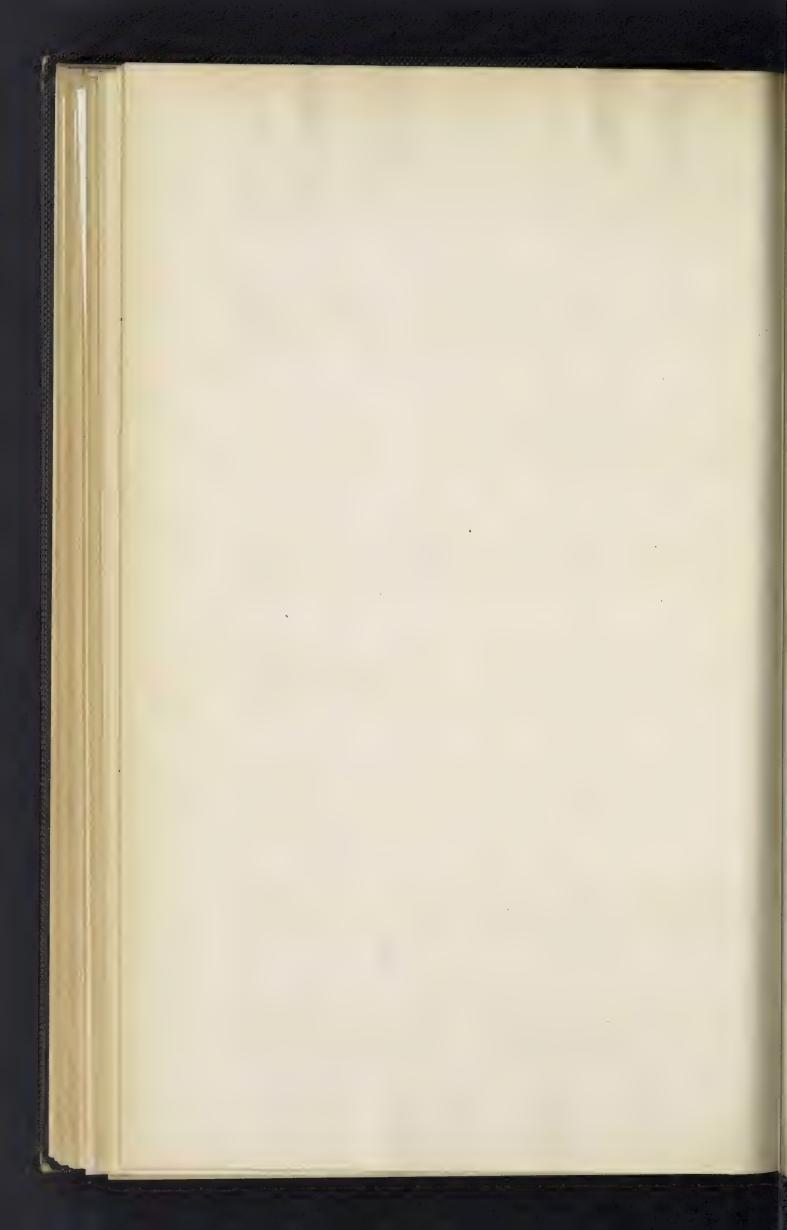
PISTACHE.—This is a yellowish green shade. It may be obtained by mixing seven parts of black, one of yellow ochre and one and half of chrome green. Or chrome yellow may, if desired, be substituted for the ochre.

*Privet Green.—A useful green, guaranteed not to face, made by Messrs. Goodlass, Wall and Co.

*Prussian Green.—This is sometimes an alizarin green. More often it is made of a mixture of gamboge and Prussian blue for water and quercitron lake and Prussian blue in oil. It is fairly permanent both in

PLATE VI.





water and oil. To imitate, mix five parts black, three parts chrome yellow, and twelve parts emerald or medium chrome green.

QUAKER GREEN.—Mix equal proportions of Venetian red and medium chrome yellow, and add blue black. Add to this mixture a quantity of chrome green equal in bulk to the three. This will give an excellent Ouaker green.

*Queen Anne Green.—A useful neutral green

made by Messrs. Mander Brothers.

REED GREEN.—Mix white, chrome yellow and chrome green in about equal quantities to produce this shade. The name, however, has no special significance, and an admixture of almost any yellow and green, lightened up with white, might be used instead.

*ROYAL GREEN.—A rich green usually made in three or four shades.

SAGE GREEN.—This may be produced by tinting white lead with four parts of light chrome green and one part of ivory black, or the white lead may be tinted with a mixture of French ochre, lamp black, and Prussian blue. Another recipe is as follows: Add raw umber and chrome green in the proportion of about one part of the former to two parts of the latter added to white lead until the desired shade is obtained. A pale Brunswick green and a very little black used to tint white also gives a good sage green.

*SAP GREEN.—An artist's colour known also as "Olive green." The colour was formerly made by the admixture of various pigments and was by no means permanent, but now the alizarin colours are usually employed both for water and oil. Mix with white lead, medium chrome yellow, and a very little lamp black.

*SAXON GREEN.—A useful colour of lead base.

SEA FOAM.—Tint white lead with medium chrome yellow and emerald green, or if too bright, use medium chrome green instead of the emerald.

SEA GREEN.—This colour is obtained by adding deep chrome to white lead. Another sea green, and a very good one, is obtained by mixing light Brunswick green, raw sienna or ochre and white.

SEERED GREEN.—Tint white lead with French ochre, medium chrome yellow and a little bright green.

STARLING'S EGG GREEN.—A mixture of light chrome and Prussian blue, lightened up with white, will produce this colour.

*Suffield Greens.—A series of beautiful greens made in nine shades by Messrs. Mander Brothers, Wolverhampton. They are a decided improvement on Brunswick greens, standing the light much better. They are made in various useful art shades, and the author, who has used them, considers them to be worthy of the highest praise from a decorator's point of view.

TEA GREEN.—Medium royal green, chrome yellow and lamp black, added to white lead will give this colour.

TERRE VERTE.—A natural green earth found in Italy and elsewhere. A yellowish variety is sold called olive terra verte. It is quite permanent both in water and oil.

VELVET GREEN.—Mix three parts of burnt sienna, five parts of light chrome green and eight parts white lead.

*Veronese Green.—See Viridian.

VENETIAN GREEN.—Lighten up dark chrome green with white lead.

*VIRIDIAN.—A beautiful transparent green; also called Veronese green. It is a hydrated chromium sesquioxide and was originally introduced by Messrs. Winsor and Newton. It is useful to the decorator for glazing, and is permanent both in water and oil.

WATER GREEN.—Raw sienna mixed with a little deep chrome green and added to white lead gives a water green tint.

WILLOW GREEN.—Tint white lead with medium chrome green, and add a little burnt umber or ivory black.

*ZINC GREEN.—A bright colour intended to take the place of Brunswick green as it stands the light and impure air better.



CHAPTER IX.

BROWNS, AND HOW TO MIX THEM.

There is no definite line of demarcation between the browns and the darker yellows any more than there is between the blues and the greens, or the reds and the oranges. One colour may be said to merge into the other. Still, Vandyke brown may be taken as a typical brown, and should therefore be experimented with. Umber is another valuable brown which yields tints of a somewhat greenish hue. In comparing different browns it is well to mix not only white with them, but also Venetian red, orange and yellow in various proportions. Then add a little black, and then ochre, and perhaps sienna.

The colour mixer who has worked conscientiously through this book thus far, will probably be surprised at finding the number of rich browns obtainable by

Acorn Brown.—This is very similar to a rich chocolate, and may be made in the same way.

ALDERNEY.—This is an orange brown in hue, and may be made by mixing fourteen parts of black, one of white, two of orange, and three of yellow.

*Amber Brown.—Mix together six parts of burnt umber, four parts of medium chrome, and three parts burnt sienna.

ARABIAN BROWN.—This is a dark terra-cotta, and may be made by adding white and black to Indian red.

Argus Brown.—This is a very dark brown, and may be made by mixing six parts of black with two parts of orange and one part of yellow.

AUBURN TAN.—This is also called "auburn brown." Mix together one part of burnt umber, three parts of golden ochre and twenty parts of white lead or zinc oxide.

AUTUMN LEAF.—This is also called "leather lake." It may be made by mixing on a base of white lead, French ochre, orange chrome yellow and Venetian red.

BISMARK.—A shade of this name may be produced by using two parts of black, one of red and one of orange, which mixed together form an orange brown,

*BISMARK BROWN.—This colour is obtained by mixing with six parts of black, one part of orange and one of yellow.

*BISTRE.—This colour is made from soot obtained by burning wood. It is principally used by artists, and must not be mixed with oil. It is not always reliable for its permanency. It may be imitated by mixing together ten parts of black with two of red and a little green.

*BITUMEN.—A dark colour called also asphaltum. It is not ground in water and is liable to cause cracks in paint.

Bronze Brown.—Black coloured with a little orange chrome and bright green.

Brown.—The methods of obtaining different browns will be found under the headings of the respective names, such as "Chestnut," etc. A good average brown may be obtained by mixing together three of Indian red, two parts of lamp black and one part of yellow ochre. A lighter colour is obtained by using more ochre and less black, in fact, a large variety of brown tints may be produced by varying the proportions of ochre and black.

*Brown Ochre.—Also called "Roman ochre," which see.

Brown Pink.—A lake made from quercitron bark. It is fugitive.

BURNT ROSE.—This is a dark red brown shade. To produce it use two parts of black, one and half parts of red, two parts of orange, and one of blue.

*Burnt Sienna.—This is a sienna calcined, the effect being to produce a darker shade. It is quite permanent, both in oil and water. The colour is a most useful one, and will be found in many of the mixtures in this book.

*Burnt Umber.—This is a rich dark greenish brown, but the shade varies considerably in different qualities. It is made from natural earths by calcining, and is permanent both in oil and water. Turkey umber is the richest. Umbers should always be purchased ground ready for use.

CAFE AU LAIT.—To produce this shade mix five parts of black, three of white, one of yellow, and a little orange. A little red may also be added if desired.

*Caledonian Brown.—A natural earth in which the colour is due to ferric oxide. An imitation may be made by mixing Vandyke brown and sienna.

*Cappagh Brown.—This is an artist's colour of a reddish brown colour, being very like umber. It contains manganese.

*Cassell Earth.—Another name for Vandyke brown, which see.

CHESTNUT.—This rich brown may be obtained by mixing four parts of medium chrome yellow and two parts of Venetian red. One part of yellow ochre may be added if desired. Equal parts of chrome and vermilion with a little black may also be used.

Chocolate.—Five parts of burnt sienna and one part of carmine or lake give a rich chocolate. A less expensive colour is obtained by mixing Indian red

and lamp black with a little yellow ochre. A touch of vermilion will clear and brighten this mixture. Another way to produce chocolate is to mix black with red, but this gives a more or less muddy shade. White and burnt umber also yield a chocolate brown.

CINNAMON.—Six parts white lead, two parts burnt sienna, and one part of golden ochre make a good cinnamon; or French ochre, English Indian red and a little lamp black will produce the same colour. Another way is to mix Italian sienna and burnt umber.

CLAY DRAB.—Mix equal parts of white lead, raw umber and raw sienna, and add a little chrome if desired. Some painters prefer to add a little medium chrome yellow.

COCOA-NUT BROWN.—This shade may be obtained by mixing one part of white lead or zinc oxide with double the quantity of burnt umber.

*Cyprus Umber.—Another name for raw umber. Coffee.—To produce this colour mix together five parts of burnt umber, two parts of yellow ochre and one part of burnt sienna.

*Cologne Earth.—Another name for Vandyke brown. It is permanent in oil, but fades slightly in water.

COPPER.—Tint zinc white with French ochre, Italian sienna and lamp black to obtain the shade shown in the sample. A very good copper shade is obtained by mixing two parts of medium chrome yellow, one part of Venetian red, and one part of drop black or two parts of lamp black, three parts of medium chrome yellow and six parts of Venetian red.

CORK COLOUR.—Tint white lead with French ochre, Indian red and a little lamp black, or with raw Italian sienna and burnt umber.

*Cyprus Umber.—One of the best grades of umber possessing a greenish hue, which is liked by artists.

DARK DRAB.—French grey, Indian red and lamp black added to white lead give this colour.

DARK LAVA.—Mix French ochre, Indian red and lamp black, and lighten with white lead.

DARK OAK.—Add French ochre and Venetian red to white lead as a base.

DOE COLOUR.—This may be produced by mixing raw Italian sienna and burnt umber with white lead, or French ochre and mineral brown with a little lamp black.

Dove Colour.—White lead, with a little Prussian blue and a touch of ivory black will produce an excellent dove colour; but French ochre, Indian red, and lamp black may be employed, or a mixture of raw and burnt Turkey umber and Italian sienna.

DRAB.—A good drab is made by using burnt umber and white lead in the proportion of one of the former to ten of the latter, but raw umber and a little Venetian red may be used instead.

*Dutch Pink.—A useful brown for scenic artists, but cannot be used in oil.

FAWN.—This might also be called deep drab. It is produced by tinting white lead with a mixture of French ochre, Indian red and lamp black, or raw Italian sienna and raw Turkey umber. Another shade of fawn is obtained by using eight parts of white lead, one part of chrome yellow, one part of Indian red, and one part of burnt umber; or eight parts of white lead, two parts of medium chrome yellow, one part Venetian red, and one part of burnt umber.

* FAWN BROWN.—A colour somewhat like raw Turkey umber, but richer. It was originally introduced by Messrs. Mander Brothers.

FAWN, LIGHT.—Tint white with sienna and a touch of raw umber.

FOLIAGE BROWN.—Mix burnt umber with raw and burnt sienna and lighten with white as may be necessary.

*French Ochre.—This colour, of course, is bought ready made, and it must be observed that, in addition to the fineness, the particular tone of this colour is very important, especially to grainers.

GOLDEN BROWN.—Sixteen parts of white lead are mixed with one of burnt sienna and three parts of yellow ochre. A more brilliant colour is obtained by

substituting zinc oxide for white lead.

Indian Brown.—Mix equal parts of Indian red, lamp black and yellow ochre.

LAVA.—An orange brown lave shade can be got by mixing fifteen parts of black, five parts of orange, four of yellow, and a very little white.

LEATHER BROWN.—Four parts of yellow ochre, three parts of Venetian red, two parts of white lead, and one part of blue black give a rich leather brown. If a lighter tint is required less black should be used. Or the following recipe may be used: mix white with three times the quantity of red and the same amount of yellow. Some painters use French ochre for a base and tint with burnt umber or Venetian red.

LIGHT LAVA.—A mixture of raw umber and raw

sienna added to white will give this colour.

LIME CHOCOLATE.—This is a speciality of Messrs. Mander Bros. It is suitable for mixing in water or oil and is very useful for all purposes of the decorative artist.

LIGHT OAK.—Add French ochre and Venetian

red to white as a base.

LIZARD BRONZE.—Fifteen parts of black, one of orange, five of yellow, and four of green will produce this dark greenish yellow shade.

*Madder Green.—A reddish brown madder shade is produced with one part blue, three parts each of

orange and red, and six parts black.

Mahogany.-Mix orange and yellow in equal proportions with five times the quantity of black.

*Mander's Yellow.—An ochre colour made by

Messrs. Mander Bros. and intended to take the place of Oxford ochre.

*Mars' Brown.—An artist's colour, also called "Verona brown." It is an earth colour and is permanent and owes its colouring to ferric oxide and the degree of heat to which it has been subjected.

MAST COLOURED PAINT.—The following recipe gives good results. Mix twelve parts of genuine dry white lead with two parts of French ochre, two parts of grey barytes, and one part of genuine oxide of iron.

NUT BROWN.—Equal quantities of red and yellow mixed with ten times as much black will give this shade.

OLD WOOD.—To get this shade mix one part of blue and red, two of orange and five of black.

OLIVE BROWN may be made by mixing three parts of burnt umber and one part of lemon chrome yellow; or another shade is given by mixing equal quantities of orange and green with about twelve times as much black. Some painters add lemon chrome yellow to raw umber for a base. Lemon yellow and burnt umber gives a richer hue.

ORANGE BROWN.—Two parts of orange chrome

yellow mixed with three parts sienna.

Pomegranate.—A golden brown shade some times called by this name is given by mixing three parts of red, six of orange, four of yellow with twenty parts of black.

*Prairie Brown.—Mix together equal parts of

orange chrome and Vandyke brown.

*Purple Brown.—The name of a well known cheap oxide. To imitate mix four parts of dark Indian red with one part of ultramarine blue and of lamp black. The addition of white lead will usually make a more satisfactory tint; if the shade is too purple, a similar quantity of blue should be added; if too red, more black may be used, or a little yellow added, but purple brown pigment is cheap.

*Raw Sienna.—Siennas are valuable earth colours most useful for staining or tinting, but practically useless as body colours. The degree of transparency determines to some extent the quality.

*RAW UMBER.—A valuable earth colour. Also

called Cyprus umber.

*Roman Ochre.—Also called "brown ochre."
Red ochre toned down with black yields a substitute.

Rural Brown.—This is a useful and good wearing brown and is obtained by mixing three parts of Indian red, two parts of lamp black, and one part of chrome yellow.

Russet Brown.—Indian red lightened with white

produces a tint sometimes called by this name.

Russet.—A very good russet shade is got by mixing twenty parts of black, twelve parts of red, ten of orange, three of yellow, and five of green. Or medium chrome green, raw umber, and a little orange chrome yellow added to white as a base will give an excellent russet.

SANDSTONE.—A tinting colour made by mixing raw and burnt umber will produce this colour.

Seal Brown.—Four parts burnt umber, one part

golden ochre.

SEPIA.—This is a natural colour used chiefly by artists and is made from a secretion of the cuttle fish. It cannot be imitated and it must not be used in oil.

SEVILLE BROWN.—A useful and cheap colour originally introduced by Messrs. Mander Bros. It may be used both in oil and water.

SIBERIAN BROWN.—Mix together equal parts of white lead and raw umber and brighten with a little

Oxford ochre.

SIENNA BROWN.—This colour is variously called "sienna brown," "teak brown," and by other names. It is made by mixing burnt Italian sienna and French ochre with pure zinc.

SNUFF BROWN.—French ochre and Indian red added to zinc white will produce this colour. Another way to produce a snuff colour is to mix four parts of medium yellow and two parts of Vandyke brown, or burnt umber may be substituted for the Vandyke brown if desired. Another snuff colour may be obtained by mixing burnt umber and yellow ochre, tinging with a little Venetian red.

TAN.—Mix ten parts of burnt sienna and four parts of medium chrome yellow with three parts of raw umber. White lead and burnt sienna, to which has been added a very little lamp black, will also produce a tan colour. A very rich tan colour may be made from ochre, burnt Turkey umber and a little orange chrome with white lead.

Thrush Brown.—One part yellow ochre, three parts burnt umber, twelve parts white lead. The addition of a little black with less umber is sometimes used.

*Turkey Umber.—The richest variety of the many umbers on the market.

*Vandyke Brown.—This is an important brown to the decorator and is nearly permanent in oil, but fades a little in water. It cannot be imitated though a little red added to umber produces a colour somewhat similar to it. It is also called "Cassell Earth" and "Cologne Earth."

*Verona Brown.—An artist's colour, also called "Mars' Brown."

VIENNA SMOKE.—The best burnt umber should be tinted with lemon chrome yellow and a little Venetian red.

Wallfower Brown.—This beautiful brown may be made by a mixture of medium chrome yellow and brown lake. Or crimson lake and burnt sienna may be mixed with medium chrome.

CHAPTER X.

GREYS AND GRAYS.

Although the dictionaries do not usually distinguish between the spelling of "grey" and "gray," and although many decorators use the two words indiscriminately, there is a distinct difference which it is both convenient and advisable to recognise. A " grey," is an admixture of black and white, and may vary from the smallest quantity of black added to white to the other extreme, where there is almost as much black as white. Anything between the two would be termed a "grey." Examples of this are found in the list which follows under heads such as: Dark lead, dark slate, lead, etc. When a colour is added to the black and white the admixture is called a "gray," provided, of course, that the black and white predominate; for example, a French gray is made by tinting white with a little ivory or drop black and adding a little carmine or crimson lake or ultramarine. It will be seen that the addition of the lake or ultramarine gives it a peculiar warmth which distinguishes French gray, and changes the spelling from "grey" to "gray." Gray drabs are those in which a grey is coloured up to produce a yellowish tinge. Black being usually a strong tinting colour, care must be taken that it is used in moderation, and here the importance of adding a small quantity at the time, as already observed, will impress itself on the operator. After the shade desired has been obtained the colour should be added until the desired warmth is arrived at.

The experiments advised in previous chapters may be continued with advantage in respect to blacks which will be found when mixed with white to possess certain characteristics which should be known to every colour mixer. The blacks which should be experimented with are ivory black, vegetable black, lamp black and blue black. It will be noticed that pure ivory black, for example, gives a distinct bluish cast, while lamp black is of a somewhat browner hue. Gas black, which is often mixed with other blacks, gives a brownish cast.

ARGENT.—A reddish gray tint, which can be produced by mixing together nine parts of black, sixteen of white, one of red, and a little orange.

Ash Gray.—Lamp black and a little French ochre added to white lead give this colour. Another mixture is as follows: two parts of burnt sienna, three parts of light ultramarine blue, sixty parts of zinc white.

BLACK SLATE.—Mix together black and Prussian blue in the proportion of about thirteen parts of the former to one of the latter and add white.

*Charcoal Gray.—Another name for Blue Black, which see. Sometimes it is a special grey prepared from charcoal and is then only suitable for water.

DARK GRAY.—Mix eight parts of black, one of white and a touch of red or blue to produce this shade; but practically any admixture of black and white in which the former predominates and to which has been added a little colour will give a dark gray.

DARK LEAD.—This is a dark grey, being produced simply by adding lamp black to white lead.

DARK SLATE.—This also is black added to white. The admixture under "Black Slate" would answer.

*DAVY'S GREY.—This colour is made by Messrs. Winsor and Newton from soot and is recommended as a reducing agent as it does not, like the blacks, sully the colours with which it is mixed, but gives pure and translucid effects and is a capital drier.

DEEP LEAD.—Black, a little bright blue, and Indian red mixed with white lead produces this colour.

FRENCH GRAY.—This can be made by tinting white with a little ivory or drop black and adding a little carmine or crimson lake and ultramarine. This produces a very slight violet tinge. White tinted with a little ultramarine and Venetian red also gives a good French gray. Celestial blue or cobalt may be used instead of the ultramarine if desired. Another good mixture is made by tinting white lead with one part of black and two parts of orange chrome. Perhaps the simplest method of all is to thin white with bright Indian red.

Granite.—French ochre and lamp black added to white lead produce this colour.

GRAYSTONE.—Mix five parts of black with three of white and a three of blue and add a little red.

Gray Drab.—Mix five parts of black with four of white and a little deep chrome yellow.

GRAY (WARM).—See warm gray.

Green Slate.—Same as lead, but with more black and blue.

Iron Gray.—Mix eight parts of black with two of white and a little orange.

JASPER.—This may be described as "a pepper and salt shade." Mix nine parts of black with two of white, with a touch of deep chrome.

LEAD.—This is simply a dark gray, and is made by adding lamp black to white lead with sufficient blue.

LIGHT GRAY.—Mix. together one part of Prussian blue, one part of lamp black, ten parts of white lead. By adding more or less white lead a darker or a lighter shade may be obtained if required. Another shade is obtained by mixing two parts of black, eight parts of white and one part of blue.

MASTIC.—This is a dark gray shade. To produce it mix twelve parts of black with one of white, rather less than one of yellow and just a touch of orange.

*MINERAL GRAY.—An artist's colour sometimes called "Ultramarine Ash."

Moss Gray.—Tint white lead with French ochre,

a bright green and a little lamp black.

Mouse Colour.—Eleven parts burnt umber, to which has been added one part of Prussian blue, mixed with about twenty times the bulk of white lead, will give this tint. Another shade may be had by mixing sixteen parts of white, three of black and one of blue. Some painters tint white with lamp black and add a very little Venetian red and burnt umber.

*Neutral Tint.—An artist's water colour is sold under this name. It is somewhat similar to Payne's Gray, and is made from a mixture of carbon black, other and French ultramarine.

OLIVE GRAY.—Three parts of lamp black, one part chrome green, with about forty times the quantity of white lead, will give this colour.

OPAL GRAY.—One part of burnt sienna, two parts of cobalt blue, and thirty parts of zinc white.

*PAYNE'S GRAY.—Is an artist's colour, which may be described as a gray having a lilac tinge. See neutral tint.

PEARL.—This is the same as French gray, but is

much lighter.

PEARL GRAY.—Forty parts white lead, five parts of vermilion and one part of deep chrome green. Some decorators tint white lead with lamp black and call that pearl gray. Strictly speaking, however, it should be called pearl grey, there being no colour present. Six parts of white lead, two parts of Venetian red, and one part of lamp black gives a somewhat dark pearl gray, but a lighter tint may easily be obtained by adding more lead. Ivory black answers equally as well as lamp black.

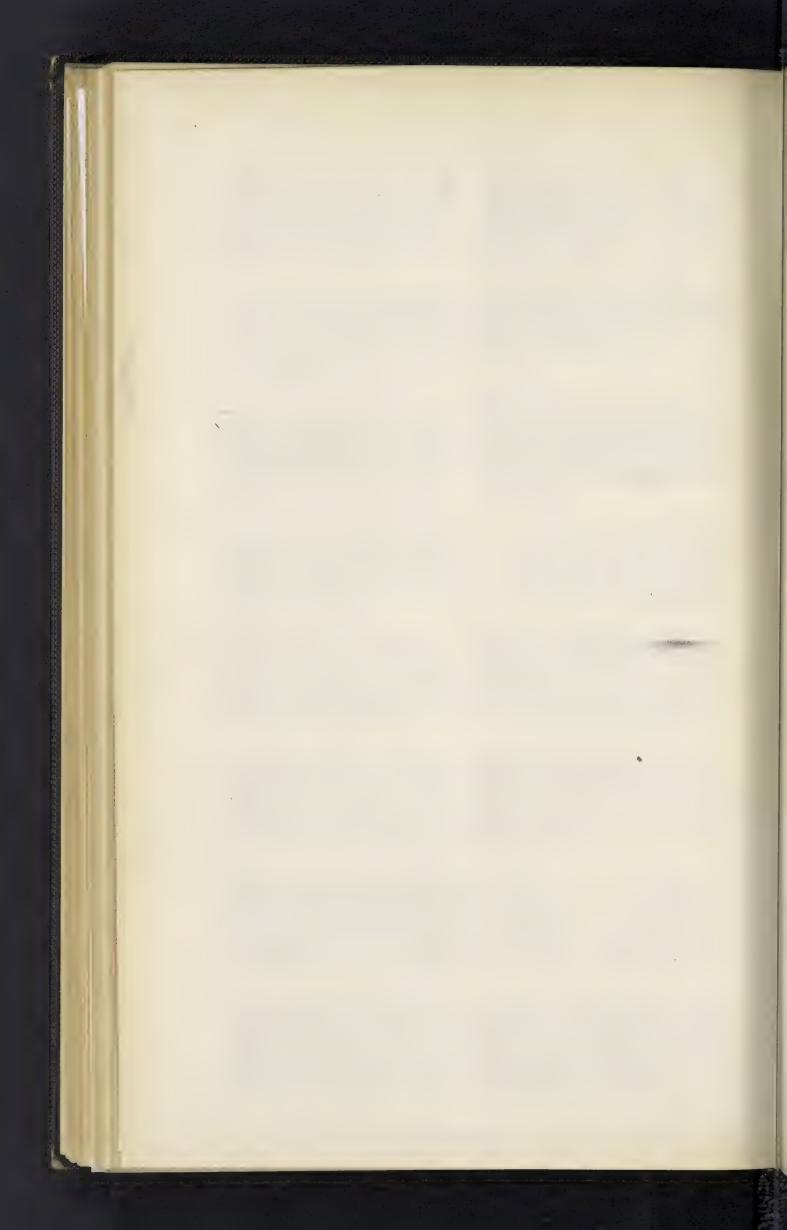
QUAKER DRAB.—This greenish gray shade is produced by mixing two parts each of yellow and green

and five parts of white.

PLATE VII.



EXAMPLES OF WASHABLE DISTEMPERS.



RUSTIC DRAB.—Tint white lead with French ochre and lamp black.

SILVER GRAY.—Tint white lead with French ochre and lamp black, or yellow may be employed instead of the ochre if preferred. White lead tinted with a little lamp black and indigo gives an excellent silver gray.

SLATE.—See "Dark Slate."

SMOKE GRAY.—Tint white lead with French ochre and lamp black.

Steel Gray.—Tint white lead with a mixture of lemon chrome and medium chrome and lamp black.

STONE GRAY.—Add black and chrome to white lead.

*Ultramarine Ash.—An artist's colour sometimes called "Mineral Grey."

VERDANT GREY.—Two parts of oxide zinc and one part of terra verte.

WARM GRAY.—Tint white lead with French ochre and lamp black or sienna and lamp black. A better mixture is produced by taking white as a base and adding a little burnt sienna and raw umber with a very little burnt umber and a touch of Prussian blue.



CHAPTER X.

WHITES AND BLACKS.

Although neither blacks or whites can strictly be called colours, yet they are both used largely in paint mixing. A list of the principal varieties is therefore included for reference.

BLANC FIXE.—Artificial barytes, or sulphate of barium. A white pigment which enters largely into the composition of Orr's white, lithopone, etc., and is principally used in paper making, and in the manufacture of wall-paper colours.

CHARLTON WHITE.—See Orr's zinc white.

CHINESE WHITE.—Another name for zinc oxide, but applied to the water colour, *i.e.*, zinc ground in water.

Constant White.—Similar to blanc fixe. It consists of sulphate of barium ground in water. It is not suitable for grinding in oil, being very deficient in body.

CREMNITZ WHITE.—Another name for flake white (q.v.) but strictly applied to even a finer preparation than ordinary flake white.

BLANC D' ARGENT.—See Flake White.

DUTCH WHITE.—Is a mixture of three parts of barytes to one part of white lead. Note the difference between Dutch white and Dutch process white lead.

FLAKE WHITE.—This is the name usually applied to white lead which is specially prepared for the use of artists. Chemically, it is basic carbonate of lead, or hydro-carbonate of lead. It is not used as a water

colour as it discolours very rapidly. The best flake white may be taken as a perfect example of white lead, and is often used for comparison. Flake white is also known as Cremnitz white, blanc d'argent, and silver white.

FOUNDATION WHITE.—A mixture of high grade white lead as used in the manufacture of artists' flake white, with another white lead of inferior quality. Although a pure white lead, it is not equal in density to flake white. It is, however, cheaper, and is sometimes employed by artists as a foundation on their canvases.

FREEMAN'S WHITE.—A mixture of sulphate of

lead, zinc oxide, and barytes.

MISCELLANEOUS WHITES.—Zinc oxide is sold ground in refined linseed oil, about thirty-five gallons being required to the ton. It is also sold mixed with barytes, china clay, sulphate of lime, etc., in varying proportions according to the price it is to be sold at. The same is true with white lead. Genuine lead requires about a gallon of refined linseed oil to one cwt. of lead. White barytes in various proportions are mixed with it to produce reduced white leads.

ORR'S ZINC WHITE.—A white pigment consisting of zinc sulphate and zinc oxide, combined with about 70 per cent. of artificial barytes or barium sulphate. It is largely used in the manufacture of washable water paint by wall-paper manufacturers, etc. It

is substantially the same as Charlton white.

Oxide of Zinc.—A white pigment which possesses the advantage of being much whiter and finer than lead, and being also free from poisonous effects. It is unaffected by sulphureted hydrogen and other gases, and is used in growing quantities in recent years.

PEARL WHITE.—Basic nitrate of bismuth.

PERMANENT WHITE.—Another name for zinc oxide when ground in oil. The term is sometimes applied to blanc fixe or artificial barytes.

PROCESS WHITE.—A special white ground in water, and essentially the same as blanc fixe (q.v.) It is prepared by Messrs. Reeves and Sons, principally for use in drawings prepared for reproduction, and is permanent.

Sulphate of Lead is sometimes called Sublimed Lead.

VENICE WHITE.—Venice white is made by mixing

equal parts of barytes and white lead.

WHITE LEAD.—This is the most important white used by painters. It is now made in a variety of ways, but no method seems to supplant that which is known as the old Dutch "stack" process, which is carried out strictly by such firms as Walker, Parker and Co., Foster, Blackett and Wilson, Alexander Fergusson and Co., John Hare and Co., the Mersey White Lead Co., and several others. A great deal of white lead is imported from the Continent, and it is mostly of inferior quality, being as a rule coarsely ground. Chemically, white lead is basic carbonate of lead, and an analysis of an average example shows that it contains roughly speaking two-thirds of lead carbonate, and one-third hydrate. The method of testing white lead will be found described under the head of testing colours.

ZINC WHITE.—Pure oxide of zinc, also called "Chinese White," "Constant White," and "Permanent White." The term is sometimes applied to a class of whites of which Orr's zinc white, Charlton white, and lithopone are examples. See also Oxide of Zinc.

Zylothin.—A white manufactured by Messrs. Baiss Brothers and Stevenson, Ltd.

BLACKS.

The chief blacks used by decorators and artists are lamp black, ivory black, and blue black. Painters who realise the desirability of using pure tinting colours generally, sometimes seem to think that any

black may be used, irrespective of whether it is pure or not. This is a great mistake, as it is just as essential that blacks be pure, as any other stainers. It may be added that some manufacturers make certain of their bone blacks, usually sold as "Drop Black" from selected parts of the same description of an animal. Thus a drop black sold by a well known American house is guaranteed to be made only from the skull and shin bone of the sheep.

Animal Black.—This is made by burning various animal products.

BLUE BLACK.—Blue black in water colour is sometimes called charcoal gray, which see. This black should be made from shoots of vine, beech, and other woods, but more frequently it is simply a bone black, or a lamp black, to which has been added a little indigo.

Bone Black.—This is made from various bones, charred, ground, dry washed, then ground in oil.

CARBON BLACK.—This is a very intense black, which is rarely sold under that name, but is used by some paint manufacturers to give strength to other blacks. It is derived from the combustion of petroleum residue.

Drop Black.—This is another charcoal black sold in the form of drops, or irregular cones. Some painters appear to consider that this particular form prevents the adulteration. As a matter of fact, the drops are produced by the pigment dropping slowly from the mill as it is ground, and if it were desired to adulterate, the material could be added in the mill.

FRANKFORT BLACK.—This is another name for drop black.

IVORY BLACK.—This is made, as the name implies, from charred ivory chips. Most of the so-called ivory blacks on the market, however, are a fine grade of bone black.

LAMP BLACK.—This useful black is made by the combustion of waste oils, principally those derived

from coal-tar distillation. Lamp black gives as a rule, a warm and somewhat brownish hue, and is quite permanent both in oil and water.

MINERAL BLACK.—Mineral black may be described as powdered coke. It is used principally in cheap

black paints.

VEGETABLE BLACK.—Vegetable black may be described as a superior class of lamp black.



CHAPTER XI.

COLOURS MADE WITH BLACK JAPAN.

A large series of most useful colours can be made by mixing black japan with ordinary painter's colours of bright hue. Black japan is made of asphaltum mixed with linseed oil and sometimes gum animi and other materials, including red lead and litharge. It is not used by house painters to the extent it deserves, although it is a great favourite with carriage painters. To test the quality apply a good coat to a board, and when dry look at it in a strong light at an angle. If it is a solid black it is good quality, but if it is either a slight greenish or reddish cast it is not reliable. When used with other colours, however, this reddish or greenish cast is not of so much importance as it is when the black japan is to be used by itself.

The following list gives a few of the principal colours that may be made, but any bright colour may be mixed with black japan in varying proportions to obtain useful colours. The reader who is interested in the subject should experiment in the same way as he has done with the other ordinary colours as described in the foregoing chapters. Take a bright red and add a very little black japan; then add to another small sample of red a little more black, and so on, mixing each and comparing one with the other. Next take a bright green and follow the same plan, then yellow, blue, etc. Excepting with the very light grades no great result will be obtained with

blues, in fact, ultramarine when added to black japan gives a very good solid black.

Perhaps the most useful colour that can be made from black japan is the series of colours suitable for scumbling. For example, when finishing relief material some very excellent tones may be obtained, especially if the colour is thinned with turpentine. Black japan has not much body, and if this is desired drop black should be added.

The reader is recommended to mix some of the colours named below in the way there indicated, and to use them over bright red, buff, or yellow grounds. If a coat of colour is given to such a ground and the surface is gone over with a dry brush some novel and pleasing effects may be produced. Such effects may be produced in an even more satisfactory manner by using "Matsine" and some of these are shown in Plates XII. and XIII.

RICH DARK RED.—Mix Indian red with a little black japan.

RICH DARK BROWN.—Mix crimson lake and black japan, varying the amount of each according to the depth required.

CHOCOLATE BROWN.—Mix orange chrome with

black japan.

LEATHER COLOUR.—This is obtained in exactly the same way as chocolate brown, excepting that rather more chrome is used.

BOTTLE GREEN.—Mix together Prussian blue, Dutch pink and black japan.

Invisible Green.—Use the same mixture as for

bottle green but use less japan.

LIGHT AND DARK REDS.—A series to which there is no end, may be obtained by mixing either vermilion or vermilionette with black japan in varying proportions.

NEUTRAL GREEN.—This is produced by adding

lemon chrome to a little black japan.

STAIN FOR WOODWORK.—This can be obtained by using any of the foregoing colours sufficiently dark, that is with enough black japan added, but taking care to thin down according to the depth required.

Note.—As a rule black japan receives a final coat of varnish, but if a dull surface is required it may be obtained by giving two coats of japan and rubbing down each with felt and pumice stone, taking care to use plenty of water.



CHAPTER XII.

GLAZING.

Although the art of glazing in painted work is not strictly a part of paint and colour mixing, yet it has a direct bearing on the subject, because of the effects which may be produced by its use. Glazing may be defined as a method used in oil painting by which a brilliancy of finish is obtained by means of a coat of a bright but transparent colour applied over another colour having much less brilliancy but much more body.

A simple example of the principle of glazing is found in the finish of ordinary green work, which is to receive a final bright coat. Here the painter usually gives two or more solid coats of slate or gray colour, and upon this paints his green, the slate showing through the final green coat to some extent, and a good solid green is the result. If green had been used from the foundation up, one or two more coats would have been needed.

The following are some of the effects which can be produced by means of glazing. A series of beautiful reds, such as wine colour, may be obtained by giving three coats of Indian red mixed with orange chrome in proportions varying according to the finish required, and finally giving a glazing coat of crimson lake, madder or carmine.

The reader will readily see that a great variety of colours may be obtained by varying the ground; thus,

a bright orange glazed over with crimson lake gives a very bright effect, while either Indian red, Venetian red, Tuscan red, or other deep reds may be mixed with yellow or used plain as an underground for the

glazing colour.

Sometimes a reddish, purplish colour is desired This can be obtained without difficulty in the finish. on a ground of Indian red mixed with a little orange chrome, and a glazing colour of purple madder. Various rich effects in blue may be obtained by applying a thin wash of Chinese blue over a deep green ground. Here again by varying the tone of the ground still different results may be obtained.

Some beautiful peacock greens and blues may be obtained on a ground of Brunswick green and chrome, by glazing with Prussian blue and lemon chrome. Deep amber may be obtained on a ground of middle chrome and a glaze of burnt sienna and orange.

A word may be said here as to the scumbling and glazing. Both processes are similar up to a certain point, which is that in both cases one colour is placed over another of good body. In glazing the top colour is transparent; in scumbling, it is solid, and a portion of the top is usually wiped off or removed, so as to expose a part of the colour beneath. The simplest example which can be given of scumbling is grained work, which is really wholly a process of scumbling; but a better example is the finish so often given to relief decoration, when a mixture of the brown, say, sienna and umber, is applied over a much lighter ground finished, say, to an ivory finish. The top colour being wiped off at the edges of the relief and elsewhere, an antique effect is the result. plain painting, this effect is sometimes produced in panelled work, and some pretty effects may be pro-For example, a rich ultramarine blue painted over with a thin glazing of yellowish white and partly removed, gives a very pretty effect.

It is a little surprising that glazing is not used more among decorators than it is. It is true that often glazing colours are expensive, such as, for instance, carmine and madder, but the actual amount of colour used is small, so that the cost of materials when compared to the excellence of result obtained is trifling.

The student of colour effects in decoration is recommended to experiment on the lines above indicated. Much will depend, of course, upon the artistic sense of the operator, but by experimenting with different transparent colours on various grounds, many unexpected and novel effects will be produced, which become valuable in the execution of high class work, particularly so in these days when plain and often sombre hued wall coverings are so much in vogue.

From what has been said it will be clear to the reader that some excellent results may be obtained by a good colourist by a judicious use of a brilliant glazing colour over a more subdued and perhaps cheaper colour of good body beneath. But there are other effects obtainable by means of an ordinary brush and the use of colours, specially adapted for the purpose: Graining may belooked upon as a description of glazing as already stated, because one colour shows through the other. The particular point which it is desired now to make clear is very well illustrated by Plates XII. and XIII., which show "Matsine" applied over various coloured surfaces. This material is made by the well known paint and varnish house of Messrs. Mander Brothers, of Wolverhampton. It is a transparent, semi-flat thickish material, and is made in thirteen colours. The remarkable effects that can be obtained by its use need very little explanation to the practical reader, who has Plates XII. and XIII. before him, but it will be seen that the effects are excelle nt while it will be found that the labour involved is trifling.

It will be observed that with these colours, one might say, hundreds of different effects can be produced according to the ground employed. If, for example, the samples of Spanish mahogany and Spanish mahogany on dark ground on the sheets are compared, and it is remembered that exactly the same "matsine" is used in each case, it will be clear that many different effects can be produced with a minimum of labour. Good colourists of ingenuity can by means of this material and a variation in their grounds produce novel effects for which they might locally obtain a reputation, but even novices could use the material with advantage, the simplicity of the application being remarkable.



CHAPTER XIII.

GRAINING GROUNDS AND GRAINING COLOURS.

A considerable difference of opinion exists among grainers as to the best method of obtaining their grounds. Indeed the most experienced men are by no means agreed as to precisely what colour a graining ground should be. For this reason the author has deemed it desirable in the present edition to give several different mixtures from various authorities.

MAPLE.—White lead tinted with a very little vermilion and about an equal quantity of lemon chrome. Some prefer yellow ochre only, others ochre and raw umber in the proportion of four ounces ochre and one ounce umber to thirty pounds of lead.

MEDIUM OAK.—Add French ochre to white lead in the proportions of about one hundred and twenty of lead to five of ochre; add a little burnt umber.

Mahogany, Dark.—Four pounds of medium Venetian red, one pound of orange chrome yellow, and one pound of burnt umber, or a little less burnt umber may be used according to the strength.

Mahogany, Light.—Mix six pounds of pure white lead with one pound medium Venetian red and five ounces of burnt umber.

LIGHT OAK AND BIRCH.—Eighty parts of white lead to one of yellow ochre produces a good ground, but sixty pounds of white lead, half a pound of French ochre, and one ounce of lemon chrome is sometimes preferred.

DARK OAK.—Sixty parts of white lead and one part of golden ochre may be used, or the following mixture if preferred. Six pounds of white lead, one pound of French ochre, two ounces medium Venetian red and two ounces of burnt umber.

SATINWOOD.—Mix six ounces of lemon chrome to fifteen pounds of pure white lead and add a little deep English vermilion.

Pollard Oak.—Tint one hundred pounds of white lead with twenty-seven pounds of French ochre, four pounds of burnt umber, and three and three-quarter pounds medium Venetian red, or mix Oxford ochre, Venetian red, and white lead in proportions to form a rich buff, ground together with equal parts of boiled and raw linseed oil and turpentine with the necessary driers added, or white lead, chrome yellow and vermilion will answer equally well.

PITCH PINE.—Tint sixty pounds of white lead with half pound medium Venetian red, and quarter pound of French ochre.

ITALIAN WALNUT.—One pound of French ochre mixed with ten pounds of pure white lead and four ounces of burnt umber and four ounces medium Venetian red give this ground.

AMERICAN WALNUT.—Thirty pounds pure white lead tinted with nine pounds of French ochre, four pounds burnt umber, and one pound medium Venetian red.

Antique Oak.—Thirty pounds pure white lead tinted with nine pounds of French ochre, four pounds burnt umber, and one pound medium Venetian red.

Ash.—White lead tinted with a very little vermilion and about an equal quantity of lemon chrome. Some prefer yellow ochre only, others ochre and raw umber in the proportion of four ounces ochre and one ounce umber to thirty pounds of lead.

BIRCH.—Eighty parts of white lead to one of vellow ochre produces a good ground, but sixty pounds

of white lead, one-eighth of a pound of French ochre and one ounce of lemon chrome is sometimes preferred.

KNOTTED OAK.—Sixty pounds of white lead, nine pounds of French ochre, and three and half pounds burnt umber. Same as Pollard Oak.

Wainscot Oak.—Mix white lead, yellow chrome and Venetian red, or white lead, chrome yellow and vermilion. Strain the colour before using.

BIRD'S EYE MAPLE.—Add a little Oxford ochre to white lead or a little Venetian red, or Vermilion will answer equally well, but only very little must be used.

BIRCH.—Add a little Oxford ochre and a little Venetian red to white lead, rather more ochre than red, to produce a very light buff colour.

ROSEWOOD AND DARK MAHOGANY.—Four pounds of medium Venetian red, one pound of orange chrome yellow, and one pound of burnt umber, or a little less burnt umber may be used according to the strength.

The examples of graining grounds given in the coloured plate with their mixtures must be taken as an average arrived at from comparison of the methods employed by different painters in various parts of the country. No doubt some readers will not agree with them, and will think that the colour should be lighter or darker as the case may be. As we have explained, the mixtures given are those which may be considered an average, and a variation of them may be made according to individual taste and judgment.

GRAINING COLOURS.

Having given the ground colours, we now proceed to give those which are used for graining. It will be understood that the method of obtaining a graining colour varies just as much as it does in the case of the ground colour, according to the opinion of the painter. The following are given as what may be safely followed to get an average good result.

LIGHT OAK.—Mix one-third burnt umber with two thirds raw sienna, and add a very little drop black.

LIGHT OAK AND BIRCH.—Burnt umber lightened with white or with Oxford ochre is frequently used.

BIRD'S EYE MAPLE.—Mix raw umber and raw sienna with a little Vandyke brown or ivory black. Three parts Vandyke brown and one part raw sienna will give a brown tint, but this must be modified according to whether brown, yellow or grey maple is to be imitated.

Ash.—Same as light oak.

AMERICAN WALNUT.—Burnt umber to which is added a little Vandyke brown will give a good graining colour for walnut.

Mahogany.—Burnt umber, burnt sienna and Vandyke brown, with the addition of a little crimson lake for over graining, will answer well for mahogany.

ROSEWOOD.—Vandyke brown, with the addition of a little black, should be used, and rose pink may be added if desired.

Mahoagny.—In producing the colour for ordinary use, such as for instance, Anaglypta or lincrusta or other relief material, mix Venetian red with equal parts of burnt umber and burnt sienna, and even add a little orange chrome to give brightness.

POLLARD OAK.—Mix burnt umber, Vandyke, raw and burnt siennas, and add a little black or ultramarine. Same as wainscot oak, which see.

Cherry.—Use raw and burnt siennas and raw umber.

CHESTNUT.—Mix raw sienna, Vandyke and raw umber with a very little burnt sienna.

Wainscot Oak.—Mix burnt and raw Turkey umber with a little megilp to prevent running. If a dark oak is required add a little black in oil or a little purple lake.

BIRCH.—Equal parts of Vandyke brown and raw sienna.

KNOTTED OAK.—Same as wainscot oak.

CHAPTER XIV.

MIXING PAINTS AND COLOURS ON THE MANUFACTURING SCALE.

With the object of giving information to that large and increasing class of paint users who desire to have an intimate knowledge of their materials, and who wish from time to time to be in a position to manufacture on a larger or smaller scale certain of the standard grades of paint materials, this chapter is added.

Although it cannot claim to be absolutely exhaustive (the subject being an exceedingly wide one) it will at the same time afford a certain amount of information and point out the main principles of the subject under consideration.

RAW MATERIALS USED IN PAINT GRINDING.

It must not be lost sight of that the manufacture or preparation of a finished paint ready for application on any surface takes place in a variety of stages. The first stage is the preparation of the pigment or mixture of pigments, that is the dry powder or powders which form the pigmentary base of the paint. preparation of pigments forms an important branch of industrial chemistry and is quite outside the scope of a volume like the present. The manufacture of dry white lead, dry zinc white, the oxides of iron, carbon black, ultramarine blue, the chromes, Chinese and Prussian blue, emerald, Brunswick, Bronze and other greens, lakes, etc., form part of this wide subject

The second stage in ready mixed paint manufacture is to reduce the before mentioned pigments or powders to the paste form by grinding them in a suitable medium. In the enormous majority of cases that medium is raw linseed oil, but occasionally and for special purposes other media are employed instead of this.

This branch of the subject, that is the mixing and grinding of the dry pigments with oil to form a paste, is termed *paint grinding*, and is a branch of the industry which is carried on by most of the large manufacturing paint houses, many of whom do not themselves make the dry pigments.

The final stage is the incorporation of the stiff or paste paint with suitable vehicles or media to form ready mixed or prepared paints as used by the painter and decorator. In our present more or less restricted view of the subject we will commence with the work performed by the ordinary paint grinder, and we will in the first instance turn our attention to raw materials used in paint grinding.

These are, as we have indicated above, the base dry colours, but they also include many other materials introduced into the paint for specific purposes. One of the most important purposes is to cheapen the product and in such cases they are termed adulterants. Sometimes, however, materials are introduced into the paint not for the purpose of cheapening or adulterating the finished article, but in order to communicate to it certain specific properties which will increase its value as a decorative or protective agent. The following list includes most of the materials used in paint grinding apart from the true pigment which is the base of the particular paint which it is desired to produce, viz.:

Barytes.—A heavy white or greyish white natural mineral of crystalline texture consisting principally of sulphate of barium. This article varies in quality

and price according to its whiteness and freedom from earthy and irony matter. The finest grades are used to adulterate white lead, white zinc, and similar high class white pigments. The commoner varieties are introduced as cheapening agents into putty and coloured paints generally. It has been termed the paint grinder's friend, and it is equally his enemy according to the point of view. Its price varies from 35s. to £4 per ton, and a peculiarity of the material is that it requires a very small proportion of oil to reduce it to the consistency of paste.

Whiting or Paris White.—This well known material (which is almost pure carbonate of lime) is used largely in cheap paints to neutralise the heavy and porous nature of barytes; it is more opaque than barytes but it is much lighter and absorbs a much larger proportion of oil. It is, as is well known, the base of common distempers and a peculiarity of the article is that although in a water medium it dries out very white, in an oil medium it assumes a yellow colour. Putty is composed largely of whiting.

GYPSUM OR TERRA ALBA.—This material is not much used in Britain in paint making but enjoys a wide use in America, and for certain kinds of paint it has much to recommend it. If it is adopted care should be taken that it should only be employed in the hydrated form, as if it is not used in this form it rapidly absorbs moisture from the air and sets into a hard impervious mass, acting precisely as the well known plaster of Paris. Terra alba of good quality is a very white pigment and amalgamates well with certain of the lighter oxide of iron colours, ochres, etc., forming protective paints of good quality.

CHINA CLAY.—This article is never used in large quantities in paint grinding, but a small proportion is sometimes introduced into paints of a spongy or

open texture in order to give coherence.

A word or two must be added with regard to the

base pigments with which the foregoing cheapeners or adulterants are mixed. Little need be said of white lead or white zinc, as to completely treat of these well known articles would cover many pages. The following brief notes, however, on the chief colour pigments may be of use, and one remark applies to them all, viz., that in manufacturing paints it is the truest economy to purchase the very best pigments that can be obtained. By *best* we mean the strongest and brightest, and these properties should in every case be carefully tested against a standard sample.

YELLOW PIGMENTS.—The ochres are natural earths, and are valued in proportion to their purity of yellow tone, staining power and freedom from materials such as chrome or cheap lakes introduced with the object of giving a fictitious yellow tone. A good quality grinding ochre will fetch a very high price and it is one of the most expensive colours to grind, requiring to be passed through the rollers many times before the grit is finally disposed of. The chromes are well known yellow pigments and are seldom ground otherwise than pure.

RED PIGMENTS.—These are obtained in endless variety, the most important being the iron reds, the best of which is oxide of iron. Thus we have Indian red, Venetian red, bright oxide reds, burble browns and purple oxides and many other oxide colours known under fancy names. In purchasing these for grinding purposes they should be examined for staining power and also for the tone of shade produced on reduction with white lead and whiting respectively. The colour produced on reduction with whiting is important for the reason that cheaper grades of paint would be produced in this way and often an unpleasing tint of red is produced on reduction. Freedom from grit is also an important feature. It is a great mistake to purchase a red which is difficult to grind even although it is otherwise cheap, as the saving in price

will be rapidly neutralised in the subsequent grinding operations. Other red pigments are the *red lakes* and so-called *fast reds* and *aniline reds*, which are used in comparatively small proportions for special

decorative purposes.

BLACK PIGMENTS.—The most important is perhaps ivory black and a large proportion of black sold under this name to-day is not ivory black at all but simply bone black, the production of ivory black being very limited. Other blacks are vegetable or lamp black and gas or carbon black. The latter possesses great staining power and is useful in giving the requisite amount of blackness to black paints which, paradoxical as it may seem, always contain a large amount of white material.

BLUE PIGMENTS used by the paint grinder are ultramarine blue, to a very limited extent, and more largely Prussian blue usually in one or other of its reduced derivatives, Brunswick blue (which is Prussian blue struck on a base of terra alba) or celestial blue, (which is composed of Prussian blue struck on a base of barytes). The enormous staining power of Prussian blue will be understood when it is said that a very excellent and strong staining Brunswick blue can be produced by striking Prussian blue on terra alba in the proportions of 12½ per cent. of Prussian blue to $87\frac{1}{2}$ per cent. of white base.

GREEN PIGMENTS.—The great bulk of these consist of the well known Brunswick greens which really consist of a mixture of chrome yellow, Prussian blue, and white base, the latter being usually barytes. In the case of greens it is of the utmost importance to use a very pure and strong staining colour, otherwise it is impossible to reduce them with economy in the mixing and grinding.

Having disposed of the dry colours used in the process of paint manufacture we now turn to the oil employed to reduce the dry colour to the paste or

stiff form. Linseed oil is the only oil of practical importance in this connection, although for artists' colours some other of the drying oils are occasionally used. The proportion of oil absorbed by the various pigments is a matter of great consequence to the paint grinder, and we give the following table compiled by Mr. J. Cruickshank Smith, B.Sc., F.C.S., the figures in which represent the number of parts of oil by weight usually required by 100 parts by weight of the respective dry colours.

TABLE OF QUANTITY OF LINSEED OIL REQUIRED IN GRINDING PIGMENTS.

White Lead (English	stack 1	made)	•••	• • •	$6\frac{1}{2}$ —7.	
" (Chambe	r proce	ess)			$7\frac{1}{2}$ —8.	
Oxide of Zinc	•••	•••	•••	• • •	20-21.	
Sulphide Zinc White		3	•••	•••	1416.	
Sulphate of Lead (Gla	asgow \	White)	• • •	• • •	8.	
Best White Barytes	• • •	•••			7.	
Second Quality Baryt	es	•••	• • •	• • •	8.	
Common Grade Baryt	tes		• • •		9-10.	
Paris White	•••	•••	•••		21-23.	
Oxide of Iron Pigmen	ts	• • •	• • •	• • •	1824.	
Fine Italian Ochre	• • •	•••	•••		87.	
Strong Staining Ochr	es	•••	• • •	• • •	30 and u	pwards.
Strong Staining Sienr	nas	• • •	•••		95	"
Fine Turkey Umbers	***	•••	• • •	• • •	85	"
Vandyke Brown	•••	•••	• • •		95	12
Vegetable and Carbon	n Black	·			95	"
Pure Chromes		• • •	• • •		12,	• •
Ultramarine					33.	
Lime Blue	• • •	• • •		• • •	25.	
Pure Prussian Blue	•••			• • •	100.	
Brunswick Blue	*				16.	
Celestial Blue	•••	•••		• • •	12.	
Brunswick Green	•••	•••	• • •	• • •	15-20.	
					_	

The question of oil is all important in paint grinding as the cost of the oil is one of the most serious considerations. It is therefore one of the problems which face the paint grinder to adjust his paint mixing in such a manner as to necessitate the introduction of the smallest possible quantity of oil in the grinding.

At the same time he has to consider that unless there is an adequate proportion of oil present he cannot get the paint to mix properly and therefore he has to hit upon the happy medium. The general rule is that the heavier the pigment the less oil it absorbs, and a reference to the foregoing table will show that this rule is followed pretty closely, white lead and barytes, which are the heaviest pigments, absorbing the smallest proportion of oil, while pigments like sienna and Vandyke brown, which are very light, require almost their own weight of oil. A further important point is that damp pigments always require more oil to grind them than dry pigments.

It is a mistake to suppose that the use of cheap or indifferent linseed oil cheapens the cost of the paint, because it does not do so. Oil containing a large proportion of albuminous matter does not go so far as a clear bright oil. Therefore attention ought to be paid to the quality of the oil purchased and also to the storage tanks to see that they are free from sludge and foots.

The last ingredient we have to revert to in the case of stiff paints is what is sometimes termed the "binder." This material may vary in nature and it is not always required. Its object is to enable the oil to retain the pigment in suspension. Thus, if the paint grinder is grinding a somewhat low quality of Brunswick green, he finds that after the paint is ground and placed in the kegs, the solid matter is apt to settle down with the result that the lower part of the keg contains a hard mass of pigment and the upper part a sloppy mass of mixed oil and pigment. To avoid this inconvenience which at once results in complaints he introduces into the paint in the process of mixing something of a tenacious viscous nature which helps the oil and pigment to remain incorporated together. Boiled oil is sometimes used for this purpose and some old fashioned grinders use a large proportion of boiled oil in their paint mixing. This practice, however, is rapidly dying out and a better material to use is a small proportion of varnish foots, say 7 to 14 lbs. to the cwt., but care must be taken that the quantity is not too large, otherwise the whole of the paint will set hard in the kegs. Before finally adopting any particular batch of varnish foots or other similar material as a binder it should be tried on a small scale, as these materials often contain large quantities of active driers and other chemical matters which act in peculiar ways on the paint.

MACHINERY AND PLANT USED IN PAINT GRINDING.

After a paint grinder has decided on the relative proportions of colour, cheapening materials, oil and binder, he has to set about amalgamating these into the stiff paint and the first process is that of mixing.

Paint mixing machines are of various types

including :—

(I) The old fashioned pug mill, which consists of a vertical cylinder with revolving spindle carrying usually six knives set at right angles to this spindle which, when the latter rotates, cut through the mass of paint and gradually mix it.

(2) The vertical mixer which consists essentially of a horizontal box or chamber containing blades which revolve and cut the paint up after the fashion

of a dough mixing machine used by bakers.

(3) The improved pan mill of which that perfected by Messrs. Torrence, of Bitton, may be taken as a type. This latter mill possesses many attractions and is especially useful where mixing has to be done quickly, as owing to the construction of this mill the paint undergoes a good deal of grinding as well as mixing.

The second class of mill referred to above is only useful for fairly soft paints. For very stiff paints the first class is said by some authorities to give the best results. The process of mixing paints in any of the

above mentioned machines is not altogether a haphazard process. For example, in mixing tinted paint it does not do to throw in all the white colour first and then dump the staining material in towards the end of the operation. As a matter of fact the best results are got by mixing up the tinting matter separately in another mill and introducing it in the mixed state into the mixture containing the white colour. This avoids the formation of lumps and irregular patches of material which would otherwise manifest themselves when the mixture was placed upon the grinding rollers.

In making up tinted paints on a large scale the order in which the various tinting materials are added is somewhat important, and if this be not attended to the result is frequently that a considerable proportion of material is wasted. In this connection the author strongly recommends anyone who proposes engaging in the manufacture of tinted paints to undertake a fairly exhaustive course of study of the actual tinting and staining properties of the pigments commonly used by paint grinders. This side of the question is very frequently left somewhat severely alone with the result that it is only after numerous failures and spoiled batches that the would-be manufacturer comes to appreciate the relative strengths and tinting properties of the raw materials which he is using. A very useful course of study is to take in rotation the various staining pigments commonly used by paint grinders, most of which we have already dealt with in the foregoing paragraphs, and to reduce these in varying proportions with white lead, white zinc and whiting. In this way a very fair idea is obtained of the variety of shades obtained by these strong staining materials.

In order to indicate a few of the points that have to be attended to in making up tinted paints in general we may discuss in some detail the manufacture of two typical tinted paints, viz.: Slate colour and mast colour paints.

We will suppose that the paint manufacturer is required to produce a slate colour paint in the stiff form, and we will imagine that the exact tint to which his paint is to conform has been given him. Let us suppose that this tint is of a somewhat pale colour of the nature of the so-called "invisible grey" used in the British Navy. Now, every practical man who has gone through a course of training in the staining properties of pigments will see by inspection of this colour that it contains four elements, viz.: white, black, blue and red, and common sense united with a little practical experience will show him that it will be fatal to the ultimate result if he adds too much black to begin with. He will know by practical trial and experience that the most sensitive or easily affected of the four elements just mentioned is blue, and he will be proceeding on correct lines if he adds the blue tinting material first. Let him therefore select his white base, which in the case of a somewhat "clean" or bright looking colour would be oxide of zinc (either pure or reduced according to the required cost with terra alba). Let him then add such a quantity of ultramarine blue as will bring the paint to the same *depth* of colour as the given sample. then adding little by little small proportions of black the brightness of the blue will be "killed" and the slate colour or greyness will gradually manifest itself. The object of the red is to neutralise the native "coldness" of the blue and black and the addition of a very small quantity of Indian red will probably suffice to give the necessary cast of colour. The proportion of Indian red will be very small and will vary according to the colour of the ultramarine used as certain grades of ultramarine possess in themselves a distinctly reddish tone.

Suppose for the moment the paint grinder were

to begin by adding black to the white base. would in all probability overstep the mark and would obtain a dark grey colour which would require the addition of a very large proportion of blue and probably of white as well to bring it to the required slate The general rule, therefore, in adding a mixture of tinting colour to a white base to produce tinted paints, is to commence with the more sensitive and delicate ones and to add the stronger and darker ones last and in the smallest proportions.

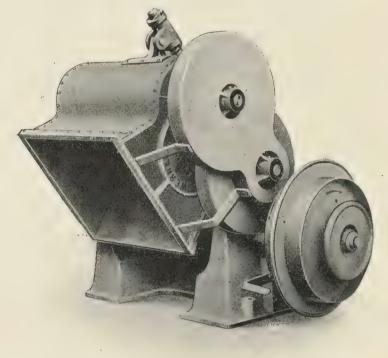


FIG. 8.

Another example of a tinted paint and the method of its product on is mast colour. In this case the white base will in all probability be white lead, containing a greater or smaller proportion of whiting, and, if the quality is a somewhat low one, a proportion of second grade barvtes as well. The tinting colours will be Oxford ochre, Venetian red, burnt seinna, and orange chrome. In this case the practical man will see at once that the ochre is the predominant material

and he therefore commences by adding a sufficiency of this pigment. He then adds sufficient burnt sienna to give the richness and density to the ochre; this he then follows with Venetian red, or in the case of some low grades he would probably use Venetian red; right through in place of sienna. Finally, he livens the whole up by means of orange chrome.

One of the chief points in paint grinding is to

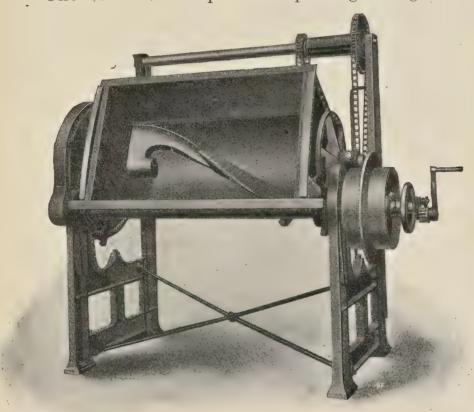


FIG 9.

judge the proportion of oil that should be added in the mixing process. Frequently the material becomes somewhat heated with the result that it works softer than it ultimately becomes when cold; this has to be allowed for.

Another type of machine largely used for the mixing of paint bodies and the thinning down of same is the "Universal Kneading and Mixing Machines,"

made by Werner, Pfleiderer and Perkins, Ltd. These have been for very many years adopted by leading paint

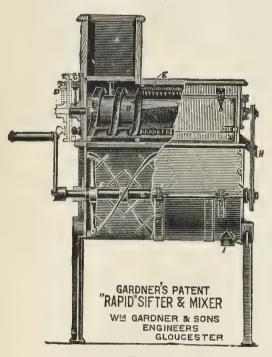


FIG. 10.

and enamel manufact-As will be seen urers. from the illustrations these machines consist of a trough container or equipped with one or two horizontal blades, the action being such as to produce the most thorough and perfect mixing obtainable, and in such manner as to prevent any possibility of settling or strati-Fig. 8 shows fication. the heavier type as used for white lead and zinc bodies, etc., whilst Fig. 9 illustrates the lighter type

in use for thinning down, stirring, etc. The "Universal" type of Kneader is also extensively used in the manufacture of the finest grades of putty. These machines are, where required, supplied with arrangements for emptying through the bottom of the trough instead of by the tilting of it.

In the preparation of fine colours and paints in oil, turpentine or water, it is often most economical

to mix and sieve the pigments while they are in the form of a dry powder and before they are ground in their medium. For this purpose a very useful machine is the "Rapid" Sifter and Mixer, manufact-

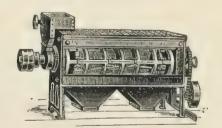


FIG. II.

ured by Messrs. Wm. Gardner and Sons (Gloucester), Ltd. and is illustrated in Fig. ro. It may be said to consist of two chambers, one above the other. In the top chamber into which the powdered pigments are introduced is a finely meshed sieve of silk which surrounds a specially constructed spiral brush. This brush very quickly breaks up tiny lumps while the mechanism causes the finely divided powder to pass through the sieve and drop to the chamber below. At the same time any foreign matter, such as small stones, sticks and irreducible lumps, are automatically thrown out of the machine through a spout provided for the purpose. In the mixing or blending chamber below to which the finely sifted powder has descended, an agitator is provided by which the blending and mixing is very thoroughly effected in a short time. A second form of the same machine is shown in Fig. 11.

A still further variety in construction is called the "Quick Change" powder dresser. In this machine the sieve can be changed so that several powders of varying degrees of fineness can be dealt with in the same day. It can also be adjusted in such a manner that two different mixings can be produced at the same time.

After mixing, the paint is transferred to the grinding rollers which now almost invariably consist of what is known as a three-roller horizontal mill. These mills have been brought to a state of great perfection, and by the use of suitable mixing apparatus the amount of grinding is reduced to a minimum. Sometimes two, three or more grinding mills are worked in series and the paint falls from one to the other becoming still further reduced at each operation. As an indication of the difference in grinding required by different pigments we may remark that white lead is usually considered to require one grinding, white zinc two grindings, ochre staining colours three grindings, sienna and some of the harder staining colours, as well as colours for coachmakers and printers' inks four to six grindings.

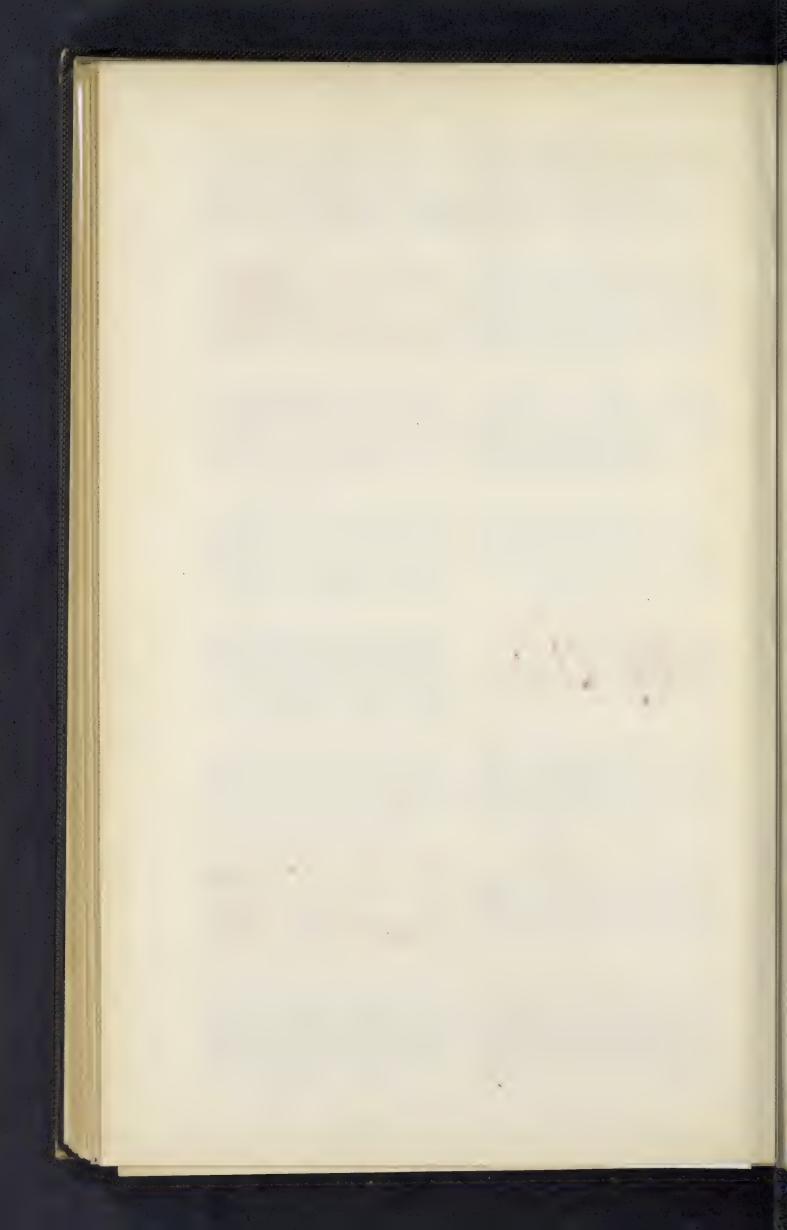
PREPARED PAINTS.

These are, as we have already indicated, the final stage in the manufacture of paint. The stiff paint prepared as already described is placed in large mixers either of a horizontal or vertical type where the proper proportions of oil, turpentine, driers and sometimes varnish are added. The machinery is set in motion and the mixture is thoroughly beaten up by means of stirrers for several hours, at the end of which time the ingredients have become thoroughly amalgamated. Anyone who has seen a paint mixing mill of this description will at once disabuse himself of any idea he may have possessed that a painter working with a domestic pail and a wooden paddle is equipped with an ideal paint mixing plant. The proportions of the various ingredients employed by manufacturers of prepared paints vary greatly. Much depends upon the consistency of the stiff paint used, the softer this is the more easily it is worked up, and many of the ready mixed paint manufacturers are very skilful in making up their stiff paint so as to require the minimum amount of thinning with oil and turps, which are expensive ingredients. Then again the quality of the stiff paint has considerable influence; the better the quality the more thinning material the paint will stand. Obviously, if the paint is of very inferior quality the addition of the normal quantity of liquid thinners would render the paint practically useless as a covering material. While, therefore, the dominating agent is the nature of the pigment in the stiff paint it is only practical trial with the particular stiff paint that is to be employed, which will indicate exactly how much thinners is required. As to the relative proportion

PLATE VIII.



NON-POISONOUS COLOURS FOR DISTEMPER.



of oil and turpentine, this also is a matter which will vary according to the necessities of the case. For ordinary outside use one part of turpentine to three parts of oil is ample, and the probability is that when turps reaches a high price this proportion will be reduced, if possible. The question has sometimes been discussed whether really glossy paint can be made without the addition of varnish. Trial has proved that this can be done by using a good bodied boiled oil in place of a proportion of the linseed oil. Indeed the introduction of varnish into prepared paint has little effect upon the gloss, although it has a considerable influence on the wear and vitality, of the paint.

The whole question of the advisability of employing varnish as an ingredient of ready mixed paints is one on which contrary views are entertained, and if the question is asked whether or not varnish is a satisfactory ingredient of these products, the answer is that it all depends upon the nature of the varnish and the composition of the paint. Assuming that the paint is made of the very best materials, carefully selected and prepared in the best possible manner, and assuming also that the varnish is selected with due regard to its composition and the composition of the ingredients with which it will be combined, then there can be no doubt that the introduction of a material containing, as varnish does, a proportion of gum resin will add materially to the life and protective qualities of the paint. On the other hand, if paint is manufactured to meet competition and if the temporary appearance of the painted surface rather than the composition of the paint itself has been the object of the paint manufacturer's attention; if, further, the composition of the varnish is a more or less unknown quantity, then it may unhesitatingly be said that varnish will do little good to the finished paint and may in many cases be a source of serious trouble.

A varnish which contains resin should never be used in mixed paints. Not only so, but many of the cheaper gums used as substitutes for the finer copals are not suited for amalgamation with pigments. Again, the presence of certain dry materials in paint often exercises very curious results on materials of a varnish nature, causing what is known as "jellying" and other disastrous results. There is no more technical or intricate branch of varnish manufacture than the preparation of what are known as mixing varnishes, that is to say, varnishes suitable for admixture with paints and pigments, and unless the paint manufacturer is prepared to spend some time in the selection of suitable varnishes he will be well advised to leave them out of the question altogether in the fabrication of prepared paints for decorators' use. Of course, in such articles as varnish paints, antifouling compositions, etc., varnish of some kind is the base of the whole thing.

The recent boom in turpentine substitutes has raised the question whether these could be safely used in ordinary prepared paint. The balance of evidence at the present time appears to show that assuming due care and caution have been exercised in the purchase of a turpentine substitute, very good paints can be prepared containing these articles, provided there is plenty of oil in the paint as well; that is to say that while a very good glossy paint can be produced containing a turpentine substitute, it would not be so easy to produce a thoroughly good flat paint.

The question of driers in ready mixed paint also deserves attention. Paint manufacturers as a rule use nothing but paste driers, and these are usually added in a considerable quantity for two reasons.

(1) Because the driers employed are usually very cheap and tend to cheapen the paint.

MANUFACTURING SCALE OF MIXING. 121

(2) Because of all the complaints to which the paint manufacturer is exposed that of bad drying in paint is most troublesome, and so long as he gets his paint to dry he is not so particular about other features.

Of late years manufacturers of prepared paints for special purposes, in particular protective paints, have been adopting the principle of using liquid driers, but detailed information concerning their use and proportions is hardly within the scope of this work.

The following are authenticated proportions which have been employed in Britain in the manufacture of prepared paints. The qualities, it will be observed, are by no means first rate, but represent very fairly what may be described as ordinary commercial qualities of tinned paints suitable for re-sale. It is, of course, in the power of the manufacturer to vary these mixings according to his actual requirements.

GROUND PURPLE BROWN (FOR R.M. PAINT).

cwts.	qrs.	lbs.	
	2	O	Dry Purple Brown.
	2	О	Paris White.
2	2	О	No. 2 Barytes.
		21	Boiled Oil Foots.
		7	Varnish Foots.
		20	Raw Linseed Oil.

GROUND BRUNSWICK GREEN (FOR R.M. PAINT).

cwts.	grs.	lbs.	
	I	21	Dry Green (pure).
	3	21	Paris White.
3	2	O	No. 2 Barytes.
		14	Boiled Oil Foots.
		14	Varnish Foots.
	I	21	Raw Linseed Oil.

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GROUND WHITE LEAD (FOR R.M. PAINT).

cwts.	grs.	lbs.	
4	0	О	Dry White Lead.
6	0	0	Best Barytes.
	2	16	Refined Linseed Oil.

Composition of one Ton of R.M. Paint on the Basis of a Variety of Shades.

cwts. 14 2 2	qrs.	lbs. 15 22 0 19	Stiff Paint. Paste Driers. Raw Linseed Oil. American Turpentine.
		Married Plants	
20	О	O	

With regard to the cost of prepared paint per ton, the following is a skeleton cost sheet, including the various items which must be included in such a statement.

COST OF R.M. PAINT PER TON.

	Ė	s.	d.
Materials as above	Ο	0	0
Cost of manufacture of stiff paint	0	0	O
,, of R.M. paint, including			
	0	0	0
,, tins	О	0	0
,, labels	0	0	Ο
··	0	0	O
,, supervision, office, travelling, a	nd		
other expenses	0	0	O

It will of course be borne in mind that the cost of tins is a very important item in the above. Tins are usually quoted at so much per gross, therefore in the case of paint packed in one pound tins there will be 2240 tins per ton, in the case of paint packed

MANUFACTURING SCALE OF MIXING. 123

in two pound tins 1120, and so on, according to the size of the various packages. It has been stated by a prominent ready mixed paint manufacturer that he considers the cost of manufacturing ready mixed paints exclusive of materials and packages, but including labour and packing, at about £8 per ton on an average of all sizes of packages.



CHAPTER XV.

WATER PAINTS, DISTEMPERS, ETC.

For many years distemper colours have been used by painters with more or less success, a large variety of colours being available for interior decoration. In most cases such distemper colours consist of whiting mixed with colour in the proper proportion to produce the desired tint, size being added by the painter to bind the particles together and prevent the colour rubbing off when the hand or clothes are brought in contact with it. Of late years various washable water paints have been put upon the market in a large variety of colours and have gained very considerably in popularity. Not only are they suitable for inside work, but in certain cases they can be employed also on the exterior of buildings. Further than this, some of the water paints may be painted or varnished over so as to produce the effect of oil paint at a considerable reduction in price. The varnish may be applied directly to the distemper or a coat of size may be given first. In the latter case there will be little or no darkening of the colour when the varnish is applied.

Hall's well known sanitary washable distemper was chosen for illustrating in a practical manner the effect of varnish as applied to their material, and the result will be found in Plate VI., which is more

fully described on page 181.

The coloured plates, numbered VI., VII., VIII., IX., and X., show many examples of different water paints, some of them of totally different character, and it is hoped that these will be of service to the reader in selecting suitable colours for his work. Alabastine, shown on Plates IX. and X., as fully explained under the heading of "Description of Coloured Plates," is a class of distemper which is manufactured in a number of colours, and supplied in the form of powder.

Some of these washable distempers shown on the Plates have a world wide reputation. The author feels that he should limit himself here to a description of the use of these water paints, leaving the reader to investigate further as to their respective merits. One point, however, is worth especial note, and that is each manufacturer issues a book of colours or tints which he keeps in stock, and these are freely supplied to painters on request. A small selection of such books will be found of the utmost use in selecting the particular colour required for any job, whether it be a simple cottage or a town hall. Indeed, such books are exceedingly useful to show to one's customer, who can quickly make a selection from them. The latest plan is to supply the books with the samples divided through the centre so that harmonious contrasting colours can be selected.

The use of water paints may be divided conveniently into three parts, (1) for interior decorations; (2), as a substitute for oil paints; and (3), to prevent blistering. We may take these three headings seriatim. For interior work they produce, if properly applied, very beautiful flat surfaces of light or bright colours as may be desired. After a little practice they are not at all difficult to apply, so as to get a flat surface without laps.

Very charming results are obtained by using a different coloured frieze to that of filling and stencilling on a simple ornament. The mistake that many painters

make is to suppose that this class of paint possesses more body than it has, or to put it in another way, because these paints have an excellent body, some painters try to produce with one coat the results that can only be reasonably expected with two. Whiting is not always the base of these paints, frequently lithopone or zinc white is employed, it being well known that zinc white acts well either in water or oil.

As to how far these paints will go, Mr. J. CRUICK-SHANK SMITH gives the following figures:-For one hundredweight, one coat, 400 yards; two coats 200 yards, and three coats, 120 yards. the most used water paints on the market is mixed with a special liquid supplied by the manufacturer, and the painter should be cautioned against making his mixture too thin, and also against adding anything (such as water), other than the ingredients recommended by the manufacturers. In every case explicit directions are given by the makers as to the use of these paints, and the painter has only himself to blame if he departs from them. We give below a few recipes for distempers and water paints arranged by Mr. W. G. Scott, the eminent American writer on paints and painting.

WALL SUCTION SIZE.

- (a) 2 lb. white glue; soak four hours in $\frac{3}{4}$ gallon cold water; dissolve on water bath.
- (b) $\frac{1}{4}$ lb. pulv. alum; dissolve in $\frac{1}{4}$ gallon boiling water.
- (c) $\frac{1}{2}$ lb. bar soap (shaved fine); dissolve in $\frac{1}{2}$ gallon boiling water.

Into solution (a) pour 2 gallons of boiling water, add solution (b), then (c); stir well, then add 8 lb. of plaster of Paris. This will stop suction on the coarsest sand wall, and the surface eventually becomes as hard as flint.

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SIZE FOR DISTEMPER.

(a) $1\frac{1}{4}$ lb. soda (carbonate of soda); $\frac{1}{4}$ lb. borax; dissolve in 3 gallons boiling water; add a little at a time, 5lb.pulv. resin; continue the heat until the resin is dissolved.

(b) 5 lb. white glue; soak four hours in 5 gallons cold water; dissolve and add 10 gallons hot water.

Mix (a) with (b).

Insoluble Wall Finish for Plaster Walls.

- (a) 4 oz. chloride of zinc; dissolve in $\frac{3}{4}$ gallon hot water.
 - (b) 2 oz. borax; dissolve in 4 fl. oz. hot water.

(c) 2 oz. cream of tartar; 8 oz. common starch; 16 oz. zinc oxide; mix with \(\frac{1}{4} \) gallon cold water.

Mix (a) and (b), boil and add (c), stirring a few minutes, then apply hot.

DEXTRINE BINDER FOR WATER COLOURS.

- (a) 8 oz. yellow dextrine; dissolve in 16 fl. oz. cold water.
 - (b) rograins thymol; dissolve in 8 fl. oz.hot water. Mix (a) and (b).

STARCH BINDER.

(a) 3 oz. common starch beat up with 6 fl. oz. cold water, then pour into 64 fl. oz. boiling water.

(b) 2 oz. gum arabic; 4 oz. pulv. borax; dissolve in 16 fl. oz. cold water.

Mix (a) with (b).

DISTEMPER AND WHITEWASH.

COMMON DISTEMPER.

(a) $\frac{1}{2}$ lb. white glue, soak four hours in $\frac{1}{8}$ gallon cold water; dissolve on a water bath.

(b) 16 lb. dry Paris white or whiting, beat up in I gallon boiling water.

Pour (a) into (b), and mix by stirring.

The above formula will make about 2 gallons of distemper, and it will weigh 12 lb. to the gallon.

The covering capacity is as follows: I gallon covers on wood, 225 square feet; I gallon covers on brick, 180 square feet; I gallon covers on plaster, 270 square feet.

The time of applying, using a 4 in. brush is: Rough walls, 22 square yards per hour; smooth walls 38 square yards per hour; flat surface, 40 square yards per hour; ceiling, 25 square yards per hour.

FENCE SIGN WHITE.

- (a) 6 lb. quicklime; slack in $1\frac{1}{2}$ gallon warm water; keep covered while slacking.
- (b) 4 oz. white resin; dissolve in 12 fl. oz. boiled linseed oil.
 - (c) 6 lb. whiting; beat up on I gallon skim milk. Mix (a) with (b) while hot, then add (c).

WEATHER WHITEWASH.

- (a) 8 lb. quicklime; slack in 2 gallons boiling water.
- (b) I lb. carb. soda; dissolve in $\frac{1}{4}$ gallon boiling water.
- (c) $\frac{1}{4}$ lb. common glue; I lb. rice flour or pounded rice; soak 8 hours in $\frac{3}{4}$ gallon cold water; dissolve on water bath.

Mix (a) with (b), then add (c).

WASHABLE DISTEMPER.

- (a) $\frac{1}{2}$ lb. white glue; soak 4 hours in $\frac{1}{2}$ gallon cold water; dissolve on water bath.
- (b) $\frac{1}{4}$ lb. phosphate of soda; dissolve in $\frac{1}{8}$ gallon hot water.
- (c) 16 lb. whiting or other pigment; beat up in I gallon warm water.

Mix (a) with (c), then add (b).

COLD WATER PAINTS.

I lb. casein, $1\frac{1}{2}$ oz. soda ash, mix with 10 lb. whiting, zinc oxide, clay, or other white pigment, or

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I lb. casein, 6 oz. Vienna lime, mix with 10 lb. whiting, plaster of Paris, etc., or 1 lb. casein, 1 oz. powdered soap, 2 oz. pulverised borax, 3 oz. dry carbonate of soda, mix with 10 lb. dry white pigment.

WASHABLE COLD WATER PAINT.

7 lb. Paris white, 2 lb. zinc oxide, 2 lb. plaster of Paris, $\frac{1}{2}$ lb. white dextrine, $\frac{1}{4}$ lb. pulv. gum arabic, $1\frac{1}{2}$ oz. pulv. borax, 1 oz. pulv. alum.

LIQUID PREPARED WATER COLOUR.

(a) 12 lb. quicklime slack in 3 gallons water.

(b) 3 lb. silicate of soda, thin with I gallon hot water, then stir in $I_{\frac{1}{2}}$ lb. casein; stir until dissolved.

(c) 2 lb. strong white glue; soak 8 hours in $\frac{1}{2}$ gallon cold water; dissolve in $\frac{1}{2}$ gallon hot water; dissolve on water bath.

(d) 2 lb. pulv. alum; dissolve in $\frac{1}{2}$ gallon hot water; then stir in 24 lb. Paris white or whiting. Mix (a) with (b), add (c), then stir in (d).

COLOURS WHICH ARE FAST TO LIME.

In executing distemper or fresco painting upon ordinary plaster, a number of colours cannot be successfully used as the free lime in plaster acts upon the colour and bleaches it. Following is a list of the principal colours which are fast to lime, and are not affected. Most of the earth colours, such as Vandyke brown, red oxide, yellow ochres, siennas and umbers, Venetian red, Indian red, light red, lithopone, zinc white, whiting, cadmium yellow, ultramarine, cobalt blue, chrome green, emerald green, lamp black, and all black pigments. The crimsons and greens are the most likely to be adversely affected by lime. The following test may be used to ascertain whether any particular colour is fast to lime or not. First mix three parts of plaster of Paris to one part of freshly slaked lime, add water, mix to a paste and place in a frame or mould about one inch deep. Place the paste in this mould, smooth level on the top, and when set remove the frame. Now take the colour to be tested, painting all the surface of the plaster slab so formed, at the same time paint a small portion of cartridge paper, and when dry, put this away between the leaves of a book, so that the light cannot get to it. Expose the painted slab to strong light for twenty-four hours, and then compare the colour with the colour painted on the cartridge paper. If there is any difference between them, the colour is more or less affected by the lime.

As a further test, place the slab into a dish or other suitable flat vessel, pour in water until it nearly covers the slab, leaving, however, the painted surface just above the top of the water. Leave it in that condition for twenty-four hours, and again compare with the cartridge paper. The water will act upon the lime, and cause it to act in its turn upon the colour. Any water paint which will stand this test may be said to be quite fast to lime.

The substitution of washable distempers for oil paints in order to lessen the cost is becoming better understood among painters every day. The writer is by no means prepared to say that one or two coats of water paint, followed by a coat of oil paint, will produce a better result from the point of view of durability than a good oil paint of carbonate of lead or zinc all through, but he does assert most positively that where it is necessary to lessen the expense, the water paint under the oil paint will produce a far better job than could be obtained by using the adulterated oil paint which would be necessary in order to keep the price within the same limits. There is an immense amount of work done by the painter which does not justify the use of the very highest class materials, for instance, cottage and small villa property, workshops, factories, where a very high finish

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is not always required, and if the work is primed with water paint and two coats of good oil paint are given on top of it, the job will be a good one. The prevention of blistering by the use of water paint above mentioned is very important and is not so well recognised among painters as it deserves to be. If a really good water paint is used it will cure the most obstinate case of blistering.

Another use for certain of the water paints which are supplied in dry powder, notably Alabastine, is for filling. The importance of having a level surface upon which to paint is well understood among painters, and the necessity is most marked in the case of enamel work, because the gloss would show up every inequality. A simple, cheap filling is made by Alabastine, and the cost is lessened also, because it may be so readily rubbed down.



CHAPTER XVI.

ARTISTS' WATER COLOURS AND HOW TO MIX THEM.

The colours used in water colour painting in most cases bear the same names as those ground in oil for decorators' use, but there are a number of exceptions. For instance, the chrome green of the artists' colourman is similar to the Brunswick green of the house painter. All of the principal names will, however, be found under the head of the various chapters headed, "Red," "Blue," etc. Note is also made in the same places of those colours which are used exclusively in water and are not suitable for use in oil and vice versa. Plate XI. contributed by Messrs. Reeves and Son will repay a careful study.

Considering the large number of artists' water colours on the market it is obvious that no artist would, as a rule, have them all at hand. Indeed, from one to two dozen colours are usually quite sufficient for the use in all ordinary water colour painting. It may be taken as a safe rule that, within reasonable limits, the more restricted a painter's palette is, the better. By the kindness of Messrs. Madderton and Company, Ltd., of Loughton, Essex, manufacturers of artists' and decorators' colours, we reprint from "Notes for Artists," the palettes of several well known artists,

and they may safely be taken as a guide.

Bell, Robert Anning, A.R.W.S.—Rose madder, pale cadmium, mid cadmium, deep cadmium, permanent yellow, cobalt blue, French ultramarine,

cobalt green (light), oxide of chromium (viridian), oxide of chromium (opaque), permanent Chinese white, Chinese vermilion, Venetian red (light red), golden ochre, raw sienna (light), trans. golden ochre, yellow ochre (Oxford ochre), terre verte, burnt umber, ivory black, raw umber, Turner brown, verona brown.

MacIntosh, J. M., R.B.A.—Light red, vermilion, rose doré, rose madder, purple madder, Venetian red, cobalt yellow (aureoline), pale cadmium, deep cadmium, lemon yellow, cobalt blue, French ultramarine, ivory black, sepia, yellow ochre, Roman ochre, raw umber, raw sienna, oxide of chromium (viridian), burnt sienna, cobalt green, orange cadmium.

SEVERN, WALTER, R.C.A.—Indian yellow, orange cadmium, aureoline, yellow ochre, orange vermilion, scarlet vermilion, alizarine, crimson, violet mineral, rose madder, cobalt blue, cyanine blue, emerald green, brown madder, transparent brown (dark), Payne's gray, ivory black.

SIR FRANCIS POWELL, P.R.S.W.—Pale lemon yellow, aureoline, yellow ochre, transparent orange ochre, raw sienna, raw umber, transparent brown (light), burnt umber, brown madder, burnt sienna, Chinese vermilion, rose madder, alizarine crimson and scarlet, cobalt violet, alizarine violet, cerulean blue, cobalt blue, ultramarine, cyanine blue, transparent green, oxide of chromium, emerald green, ivory black.

LINTON, SIR JAMES D., R.I.—Brown madder, purple madder, ruby madder, scarlet madder, pale cadmium, deep cadmium, orange cadmium, cerulean blue, cobalt blue, French ultramarine, oxide of chromium (viridian), scarlet vermilion, burnt sienna, Venetian red (light red), raw sienna (light), Roman ochre, transparent golden ochre, yellow ochre (Oxford ochre), yellow ochre (light), Prussian blue, old terra verte, burnt umber, blue black, ivory black, raw umber, transparent brown (dark).

BAYLISS, SIR WYKE, P.R.B.A.—Yellow ochre, lemon yellow, aureoline, raw sienna, light red, madder carmine, Chinese vermilion, cobalt blue, ultramarine, ash, Vandyke brown, sepia, burnt sienna, emerald green, ivory black, brown madder.

The following water colour palettes are taken from "The Chemistry of Paints and Painting," by

Prof. A. H. Church (Seeley).

SIR JOHN GILBERT, R.A. (15 pigments).—Chinese white, yellow ochre, raw sienna, vermilion, light red, Venetian red, Indian lake, cobalt, ultramarine (artificial), indigo, Prussian blue, Antwerp blue, burnt sienna, Vandyke brown, and ivory black.

ALFRED W. Hunt (17 pigments).—Lemon yellow, gamboge, yellow ochre, raw sienna, vermilion, light red, Indian red, madder lake, terra verte, cobalt, ultramarine, ultramarine ash, smalt, madder brown,

raw umber, burnt sienna, burnt umber.

A palette that is useful for flower painting for those not well versed in mixing color—is as follows: Raw sienna, burnt sienna, Chinese white, yellow ochre, gamboge, Indian yellow, lemon yellow, Prussian blue, French blue, cobalt, Naples yellow, emerald green, purple lake, crimson lake, pink madder, brown madder, brown pink, sepia, Vandyke brown, scarlet lake, scarlet vermilion, carmine, clive green.

It will be readily understood that from these palettes nearly any colour or hue may be obtained so that the artist has at hand means for obtaining any effects desired. Occasionally it may be found desirable to buy a small tube of some special colour for a special purpose or to obtain a special effect.

Although we have given below a few mixtures by which some colours can be imitated it is more important to the beginner in water colour painting to know the general effects of admixture and the purposes for which they may be employed. Mr. Frederick Oughton has copyrighted a colour chart for water

Plate showing how 40 Tints may be produced by the intermixture of Blue (A), Yellow (B), Red (31), with White.

The Rule for obtaining these 40 Tints will be found within.

62	80	
63	81	
64	82	
65	 83	
66	 84	
67	85	
68	31	
69	86	
70	87	
71	88	
71 A	89	
72	90	
73	91	
74	92	
75	93	
76	94	
77	95	
В	96	
78	97	
79	98	1

These Tints have been stippled, the primaries will be seen on the back of this sheet, brushed plain.

Twenty-seven useful Tints and Shades in Distemper Painting.

Blue White.	Cream White.			Clear White.
25	26			A
L	* 20			В
27	24			Н
28	29			C
21	22			G
30	23			F
4	31	- Linn		7
5	6			34

NOTE.—The above specimens are brushed out. On the other side of this sheet are shown specimens of stippled work. colour painting which the author recommends strongly to beginners for close study. It is published at 2s. 6d. by Messrs. Winsor and Newton, and consists of a sheet of cartridge paper divided into twenty-one numbered spaces. Upon each is given a wash of two or more colours, pure at the top and blended together immediately below, being lightened off by the addition of water as the colour reaches the bottom. The following colours are used: (1) Indigo, Vandyke brown, and alizarin crimson; (2) French blue and brown madder; (3) Cobalt, sepia, and alizarin crimson; (4) Cobalt and light red; (5) Cobalt rose madder and yellow ochre; (6) Cobalt and raw sienna; (7) Cobalt, rose madder and aureolin; (8) Cobalt and yellow ochre; (9) Sepia and gamboge; (10) Indigo and yellow ochre; (11) Indigo and gamboge; (12) Indigo and sepia; (13) Prussian blue; (14) Prussian blue, burnt sienna and gamboge; (15) Prussian blue and aurora yellow; (16) Prussian blue and aureoline; (17) French blue and alizarin crimson; (18) Cobalt and rose madder; (19) Rose madder and yellow ochre; (20) Vermilion and gamboge; (21) Vermilion and yellow ochre.

The chart indicates at a glance the different colours which are obtained by mixing the various pigments mentioned above after each number. The student might very well prepare for himself a number of such charts based either upon his individual fancies as to a palette, or by taking one or even several of those given above. It would be excellent practice to make a chart on every one of these palettes and to keep all the charts for constant study and inspection as recommended under the head of "How to Learn to Mix Colours."

How to Imitate Water Colours.

It will be noted in the following list that white, which is so important an element in mixing oil colours, is almost wholly omitted. The reasons for this are

first, that the addition of water to water colours produces a thin wash or a tint in the same manner as pigmentary white in oil colour; next, that if white pigment is added in any quantity to a water colour a chalkiness results and the tone of the colour is destroyed, and third that the paper or ground in water colour painting being usually white this forms an element which must always be considered. Moreover, crude white is very rarely employed in water colour painting excepting, perhaps, for small high lights and cloud effects.

The following brief list gives the mixtures by which some of the colours named may be imitated.

ALIZARIN GREEN.—Prussian blue and gamboge or aurora yellow.

Blue Black.—Indigo and sepia.

BURNT SIENNA.—A close imitation may be obtained by mixing madder carmine and cappagh or Caledonian brown.

CADMIUM.—Chrome yellow with a very slight addition of burnt sienna.

CADMIUM ORANGE.—Add a little vermilion to medium cadmium yellow.

Cologne Earth.—Prussian blue and sienna.

GRAYS.—A large series of grays suitable for skies may be produced by mixing either of the following colours with or without black as may be required: Lake and cobalt; lake and indigo; light red and cobalt; Indian red and cobalt; indigo, lake and burnt sienna; indigo, lake and gamboge.

HOOKER'S GREEN.—Prussian blue and gamboge or aureolin.

Indigo.—Dark ultramarine with black and add a very little veridian, or mix Prussian blue, crimson lake and black.

INDIAN RED.—Tone vermilion with a very little yellow ochre and add madder carmine and ivory black until a match is made.

LIGHT RED.—Mix together yellow ochre, vermilion and cappagh or Caledonian brown.

MADDER Brown.—Vandyke brown and crimson.

PRUSSIAN BLUE.—Add black and a very little veridian to ultramarine.

NEUTRAL ORANGE.—Cadmium and Venetian red.

RAW SIENNA.—Mix aureolin, yellow ochre, with cappagh or Caledonian brown.

Rose Madder.—Crimson lake with a little Vandyke brown.

SEPIA.—Vandyke brown and black.

VANDYKE BROWN.—Tint cappagh or Caledonian brown with madder carmine and sadden with a very little black.

VENETIAN RED.—Mix together yellow ochre, vermilion and madder carmine and add a little cappagh or Caledonian brown.

SUGGESTIONS FOR PAINTERS IN WATER COLOUR.

Although the above list may be useful under some circumstances the beginner in water colour painting will be more interested in learning the mixtures which may be successfully employed in various parts of a picture and to such the following hints will be useful for study. It must always be remembered that thin washes are, as a rule, intended.

AUTUMNAL TINTS (See also skies).—(a) Indian yellow; (b) French blue and brown pink; (c) Cobalt, Naples yellow, and rose madder; (d) Gamboge and rose madder.

Banks, Earthy.—(a) Light red, yellow ochre, and Payne's grey; (b) Gamboge and burnt sienna; (c) Yellow ochre and Vandyke brown.

BRACKEN.—Yellow tints, yellow ochre, French blue and Indian yellow. Green tints: French blue and yellow ochre. Red tints: cadmium, Venetian red and burnt sienna.

Branches of Trees.—(a) Vandyke brown; (b) Brown madder with or without a little French blue; (c) French blue and brown madder; (d) Rose madder and blue black; (e) Sepia and brown madder.

Backgrounds.—It is almost useless to give mixtures for backgrounds, because to put it crudely anything will do for the purpose provided that it harmonises the picture itself or either throws in relief or acts as a foil as the case may require. The following are some useful backgrounds other than plain greys and grays which are so often employed. (a) Cobalt blue, Chinese white and emerald green; (b) Cobalt and brown madder; (c) Cobalt and scarlet vermilion with a little emerald green.

CLOUDS AND DISTANCES.—Mix thin washes, either of the following in varying proportions according to circumstances: (a) Cobalt, yellow ochre, and rose madder; (b) The same, omitting the cobalt; (c) Brown madder and cobalt; (d) French blue, burnt sienna, and crimson lake; (e) Indigo and blue black; (f) Cobalt and light red; (g) French blue and blue black; (h) cobalt, light red and rose madder; (i) Yellow ochre or Indian red with a little rose madder.

CLOUDS (STORMY).—(a) Blue black and light red; (b) French blue and blue black; (c) French blue, light red, and blue black.

FLOWERS AND FRUIT.—It is obviously impossible within the limits of the present work to give anything like a complete list of the different colours used in painting fruit and flowers; indeed, their number is infinite. A few of the most important, however, may be given. (a) Vermilion and gamboge (marigold); (b) Vermilion and yellow ochre; (c) French blue and crimson; (d) Rose madder and cobalt; (e) Rose madder and yellow ochre; (f) scarlet lake and cobalt (Christmas rose); (g) Madder and white or pink madder by itself (pink rose); (h) Scarlet lake and carmine (red rose); (i) Crimson lake and purple lake (dark parts

of cyclamen); (j) Crimson lake mixed with either purple lake, madder brown, Indian yellow or gamboge (carnation).

Foliage, Grass and Herbage.—Clearly a wide range of greens, reds, and yellows may be employed for these purposes. The following are some suggestions.

(a) Veridian and French blue; (b) Gamboge and sepia; (c) French blue and emerald green; (d) Emerald green and gamboge; (e) Indigo and gamboge; (f) Indian yellow and burnt umber; (g) Indian yellow and French blue; (h) French blue, Indian yellow and burnt sienna; (i) Yellow ochre and French blue; (j) French blue, rose madder and yellow ochre; (k) Indigo, light red and yellow ochre; (l) Gamboge, burnt sienna, and French blue; (m) Burnt sienna, Indian yellow and French blue; (n) Yellow ochre, gamboge, French blue, and burnt sienna.

Foliage and Herbage (Distant).—(a) French blue and brown pink; (b) Yellow ochre; (c) Brown pink mixed with French blue and either burnt sienna or Vandyke brown; (d) Naples yellow and cobalt; (e) Cobalt and lemon yellow; (f) Naples yellow, yellow ochre, and cobalt.

Foregrounds.—(a) Brown pink, either by itself or mixed with burnt sienna, Vandyke brown or gamboge; (b) gamboge and yellow ochre; (c) Yellow ochre and cobalt, with or without a little light red.

GRASS.—(a) French blue and gamboge; (b) Indigo and gamboge; (c) French blue mixed with gamboge and yellow ochre or Indian yellow; (d) French blue and yellow ochre.

GRAYS, WARM AND COLD.—For clouds, hills and distant effects. To get these mix either of the following, depending upon the circumstances:—Mix cobalt with either (a) Light red; (b) Raw sienna; (c) Sepia and crimson; (d) Rose madder and aureolin, or (e) Rose madder and yellow ochre. Mix indigo with

crimson and Vandyke brown or mix French blue with brown madder.

Ivy.—(a) Indigo and burnt sienna; (b) Yellow ochre, brown madder and French blue; (c) Brown madder, French blue, and a little cobalt.

Leaves and Stems of Flowers.—Here again a very large variety of greens might be given, but the following list will be found to suit most requirements: (a) Naples yellow or gamboge mixed with a little emerald green; (b) Cobalt or French blue mixed with carmine and Naples yellow; (c) Prussian blue and gamboge; (d) French blue, gamboge, and yellow ochre; (e) French blue, raw sienna, and gamboge; (f) French blue, scarlet lake, and a little Naples yellow. NOTE: This gives a delicate bluish mauve suitable for the under part of the leaves of the cyclamen; (g) Indian yellow, gamboge and Prussian blue; (h) Olive green used alone or mixed with a little raw sienna, white or Prussian blue; (i) Prussian blue, sepia and raw sienna; (j) Cobalt gamboge and yellow ochre. This list might be added to almost indefinitely, but inasmuch as several greens are usually to be found in the palettes of most painters further examples are not necessary.

MOUNTAINS.—(a) Yellow ochre, cobalt and rose madder; (b) Either two of the three last mentioned; (c) Cobalt, rose madder, and raw umber; (d) Light

red, rose madder, and cobalt.

RIVERS.—The colours used will depend, of course, upon the state of the river. If it is calm raw sienna with a little Vandyke brown and cobalt will answer. If dark, Indian yellow, sepia, and lake may be used, or Vandyke brown, Indian yellow and lake.

Roads.—(a) Rose madder, burnt umber, and indigo; (b) Light red and blue black; (c) Yellow ochre; (d) Yellow ochre, light red, and either Payne's grey, or a little cobalt; (e) Yellow ochre and Van-

dyke brown.

Sea.—(a) Cobalt mixed with either light red, burnt sienna or lake, and yellow ochre; (b) Indigo, yellow ochre, and rose madder; (c) Raw sienna mixed with blue black or cobalt.

Shadows.—The colour of shadows will, of course, always depend upon the colour of the object upon which they are thrown. The following mixtures are among the most useful—

(a) Brown pink, French blue and lake; (b) Lake and Indigo; (c) Blue black, lake and burnt umber;

(d) Cobalt rose madder and yellow ochre.

SHADOWS, ESPECIALLY OVER FLESH COLOUR.— Mix cobalt and raw sienna.

SHADOWS (FOREGROUND).—When a purple shadow is required use either (a) Cobalt mixed with rose madder; (b) French blue and crimson.

SHADOWS (GENERAL).—Vary either of the following: (a) French blue, burnt sienna, crimson lake; (b) Cobalt, raw and burnt sienna.

SHADOWS (WARM AND COLD).—(a) Sepia, indigo, and crimson lake; (b) Indigo and light red; (c) Crimson lake and blue black; (d) Light red and blue black; (e) Indigo and Indian red.

Ships (Hull).—(a) Burnt sienna; (b) Lake and Vandyke brown; (c) Burnt sienna, brown madder and blue black. SAILS: (a) Raw sienna; (b) Yellow ochre, and umber; (c) Roman ochre; (d) Brown madder and light red.

Skies.—Skies may vary from differently toned grays to pure cobalt: Under the head of grays on page 83 will be found a number of different mixtures most of which are suitable for sky work. The following are additional mixtures:—

(a) Cobalt and rose madder; (b) Indigo and Indian red: (c) Cobalt and a little Chinese white or (d) Cobalt by itself.

STONE WALLS.—(a) Rose madder and blue black; (b) Yellow ochre and Vandyke brown; (c) Blue black (d) Indigo and sepia; (f) Yellow ochre and blue black; (g) Yellow ochre, light red and blue black.

SUNSET AND SUNRISE.—The same as Autumnal Tints, which see.

TREES: DISTANCE AND MIDDLE DISTANCE.—Use either of the following: (a) Indigo and gamboge; (b) Sepia and gamboge; (c) Cobalt and yellow ochre; (d) Indigo and yellow ochre; (e) Indigo and sepia; (f) Cobalt, lake and yellow ochre; (g) Brown pink, indigo, and burnt sienna; (h) Gamboge, light red, and indigo.

Trees (In the Foreground).—Either of the following mixtures will serve: (a) Prussian blue, gamboge, and burnt sienna; (b) Prussian blue and aureolin; (c) Prussian blue and aurora yellow and Prussian blue and burnt sienna; (d) Gamboge, yellow ochre, and indigo; (e) Gamboge, burnt sienna, and indigo; (f) Naples yellow, Indian yellow. French blue, and a little burnt sienna.



CHAPTER XVII.

TESTING COLOURS.

Although to accurately test the quality of a colour requires somewhat elaborate experiments, both chemical and practical, yet there is no reason why the painter should not determine with a sufficient degree of accuracy for his purpose the quality of the colour he uses. Indeed, if this was done more generally, many of the grossly indifferent colours would be driven from the market, and none would rejoice more at such a result than the colour manufacturers themselves. The writer has no connection with, or interest in, these manufacturers, but it is only fair to assert that they are as desirous that the trade should use pure colours as the painters can possibly be. Even the largest houses produce cheap grades of colours, and this they do almost under a protest and simply because they are compelled by painters demanding colours for certain low prices, far below that at which it would be possible to produce the pure article. As a rule such adulterated colours do not bear the name of the maker. Our advice to painters is: Make a careful comparison between pure colours and those you are using. At the same time, compare the prices and then see which is cheaper to use. If even they come out at the same price, remember that by using a pure colour you will have all the benefit of that purity of tone so necessary for the execution of good work.

The first thing to be done in testing any paint material is to have a standard. There must be no doubt about this. Unless we have in each case something with which to compare the particular sample of colour that is being examined, we shall have no useful information concerning it. Take, therefore, good decorators' colours of well known make. necessary purchase small tubes of the best colours, such as are put up for artists' use. This will be rather a severe trial, but still it will afford a standard. Having such samples and going through the tests we are about to describe, the painter can, after some amount of trouble, arrive at results which are almost as accurate as those which could be deduced by a chemist. expert on this question some years ago summarised the characteristics of colours which should be considered in making the examination, under the following heads:—

I. Purity of the material.

2. Purity of the tone; brilliancy; richness, which indicate the amount of care in selection.

3. Fineness of grinding or preparation; this means the degree of the division of the particles and upon the completeness of such division the durability will in a great measure depend.

4. Its spreading capacity.

5. Its body. This applies, of course, only to opaque or semi-opaque colours. Body is opacity, and means capacity to conceal the surface to which the paint is applied, and must not be confused with spreading. It is an inherent quality.

6. Its staining power or tinting strength with

white or colours.

7. The quality of purity of the tint obtained by mixing with white.

8. If a paste colour, the consistency of the paste.

9. Transparency of transparent colours and the quality of the transparency.

10. The permanency of the colour.

It will be observed that all of these tests will not necessarily be applied to every colour. For instance, a transparent colour would be tested for its transparency, but certainly not for its body. The one condition is the converse of the other.

We will now consider the above-named qualities

separately.

PURITY OF THE MATERIAL.—This is sometimes of considerable importance, as in the case of white lead, whilst in others—for example the earth colours—it can hardly be said that there is a standard of purity. As a rule a knowledge of practical chemistry is necessary in order to determine whether a sample of paint or

colour is pure or not.

The purity of white lead, however, can readily be ascertained by the painter who possesses no chemical knowledge, viz., by aid of the blow-pipe. Take a piece of flat charcoal and scoop out a hollow space from it into which place a small piece of white lead to be tested, about the size of a pea. Now direct the flame of a blowpipe upon it, using an ordinary paraffin candle or a Bunsen burner, taking care that the blue portion of the flame bears upon the lead. Keep up a steady blow for a few minutes and the white lead will be converted into metallic lead, which will show in the form of a bright silver-like button. If the lead is adulterated the blowing will only have the result of making it appear like a cinder. To conduct this experiment successfully requires a little practice with the blow-pipe in order to obtain a steady flame.

Another method of testing is to place a little white lead in a crucible and place this on a hot fire, when, if genuine, it will be converted into metallic lead.

A form of blow-pipe that may be purchased at most ironmongers' shops consists of a wooden handle and a container filled with cotton soaked in benzine. To this is attached a rubber tube with a mouthpiece.

This blow-pipe is very easily used, and may be successfully employed in testing the purity of white lead in the manner indicated.

Purity of Tone.—Some remarks on this subject will be given under the heads of the various groups of colours. Speaking generally, the richness of brilliancy of tone is easily discernible by placing the sample to be tested side by side with another of well known excellence. In siennas, ochres and umbers the selection of crude material by which the richness of tone is assured is of great importance.

Fineness of Grinding.—The method of testing the fineness of a pigment usually employed by the painter is to rub a little on the finger nail; but this is a crude and unreliable method. If the pigment is dry and it is desired to compare it for fineness with a similar pigment or white lead, the following is as good a plan as any:—

Take two tall vertical glass jars, place in them an equal amount of turpentine, and then take a small quantity of the white lead to be tested. Place it in one jar, and an equal quantity of the pigment with which it is to be compared, in the other; thoroughly stir up both and then note the time it takes the samples to settle. If graduated marks are made on the two jars the observations will be taken more readily.

Another test is to weigh out equal quantities of the two leads, and then to take a very small quantity of the same colour, say black, and add to each sample, thoroughly mixing. The lead that is the lightest in colour will be the finest. The explanation of this is somewhat interesting. Suppose that we have a number of cubes of white lead each measuring one inch side. This will give us six superficial inches to be coloured. Now suppose that we break up these inch cubes into half inch cubes, which will give eight half inch cubes to each inch cube. Now as each half inch cube has six faces measuring half an inch by half an

inch, it has a superficial surface of three square inches; and as there are eight of the half inch cubes, there are twenty-four superficial inches to be coloured against six in the inch cubes. It will be seen, therefore, that by increasing the fineness of a pigment a greater surface is presented to be coloured, and hence more colour is required.

Another test for fineness is to paint different samples thinned in turpentine on plate glass; when dry the two specimens may be compared, and the difference of fineness between them will soon be apparent.

Still another test, and one frequently used by painters, is to place a quantity of the colour ground in oil that is to be tested upon a level surface such as a piece of glass, and to run the blade of a spatula or palette knife over it, and then over another sample with which it is to be compared, noticing carefully the difference in appearance of the two samples. By these means the presence of grit is discovered.

Spreading Capacity of pigments and their "body" are very nearly related, although of two equal in body one may possess greater covering power or spreading capacity than the other. A practical method of testing covering power is to mix a small quantity of a standard paint and an exactly similar quantity of the pigment to be tested, taking care to use precisely the same amount of oil and thinners in each case. Then, taking a clean brush for each of the paints, paint a door, or other surface that has been primed, on two panels side by side, continuing to paint till all the pigment has been in each case used up. The one that goes farthest has the greater covering power.

In comparing the two it will be well to notice whether the body is equal to both cases, as one may go farther but not cover so well.

Body.—The word "body," as applied to pigments, is almost synonymous with opaqueness. It is the most important property of a pigment, and it is because white lead possesses the quality in an eminent degree that it is so much valued.

Body is sometimes called "covering power," but this term is a little misleading, as some may suppose it to relate to the spreading capacity of the pigment.

If two different white leads ground in oil to an equal consistency be applied to different panels of a door, primed in the same manner, the one of the two leads that possesses the better body will be shown by it hiding the grain of the wood better. Some white leads, especially those that are manufactured by the new processes, lack this important quality of body, and three coats will only cover the work as well as about two of old process whitelead.

There are numbers of methods of practically testing the "body" of pigments, among the simplest

being the following.

Prime and paint a board with alternate black and white squares, like a chess- or draught-board. Take a sample of a pigment, similar to that to be tested, of which the body is known to be good, and paint a wide strip across the chess-board; then paint a smaller strip of the pigment to be tested. When both strips are dry, by comparing them one can tell almost at a glance which has the better body, the superior pigment covering or hiding the black squares better than the other. A second coat may afterward be applied to each over a portion of the strip, if desired.

It may be again mentioned that in all cases of practically testing paints the results are obtained by comparisons being made, and hence it is necessary in every case to have a standard with which to compare the sample to be tested as has already been explained.

The test of painting over squares of black and white may be varied by using stripes instead. The test

answers equally well for white lead, zinc, lithopone or any pigment of which the quality of body is of importance. In some colours it is of little moment.

TINTING OR STAINING STRENGTH.—We have already explained at length how greatly the tinting strength of different colours or stains varies. painter can test the tinting strength of any colour himself in a very simple manner. All that is necessary is to have a pair of apothecaries' scales, some blotting paper, a palette knife, some pieces of glass or a flat piece of marble and some pieces of waxed paper. First weigh out say eighty grains of dry white lead or dry zinc. Any other white will answer equally well. Place these eighty grains on one side of the glass and the second eighty grains on the other. Now take the dry colour and weigh one grain and add that to one of the little piles of white, then weigh a grain of the standard colour and add that to the other pile. Next add to each pile a few drops of oil, taking care that the number of drops is the same in each case. With the palette knife thoroughly mix until no streaks can be seen and the mixture is perfectly uniform. Then by comparing the two the difference in tinting strength will at once be apparent. The same result would have been produced had ordinary white lead ground in oil been used instead of dry lead or zinc. If the colour is ground in oil a little difference in the method must be observed, the reason being that one colour might be ground much thinner than the other, in other words might contain much more oil than the other, and hence if equal weights of each were compared the result would be misleading. Take then each colour in oil that is the standard and the colour with which it is to be compared—place on a small quantity of blotting paper and allow it to remain a few minutes so that the oil may be extracted. If it is thought necessary the sample can be washed with benzine, but for painters' purposes the extraction of the oil by means of blotting

paper is sufficient for the purpose. The two samples having remained on the blotting paper for a short time one grain of each is weighed out separately on little pieces of wax paper, this being used so that the colour shall not stick to the scale. Then each grain is mixed separately with the white and the result compared as before. It is not too much to say that every painter should be prepared to make this test, because it informs him not only as to the tinting strength of the colour, but also gives valuable information as to the tone, etc. Of course the quantities may be varied if necessary, and a larger amount used instead of the single grains. It need hardly be pointed out that scrupulous cleanliness is necessary for successfully carrying out this The palette knife must be wiped between each operation and every care taken to do justice to both samples.

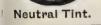
If the reader will turn to Plate I, in this work he will see a number of colours given in their full strength, and also when reduced with certain parts of white, as marked upon the sheets. The colours used in the preparation of this sheet were of excellent quality, and it will prove interesting no doubt to the student to mix the colour he has been in the habit of using in the same proportion with white, and to note whether the results come out above or below those shown by our samples.

The Permanence of Colours.—It must be admitted that it is very disappointing to a painter to find, after taking pains to produce the exact colour required, that it "flies" or fades after a little exposure to the weather. The tests for the permanence of a colour when exposed to light are simple enough, and are to mix a little of the colours to be tested in oil and to spread them on different slips of paper, cut the paper in half, number each half with corresponding figures or letters, expose one half to a strong light for as long as may be deemed desirable and put the other half away

SPECIMENS OF TYPICAL WATER COLOURS.





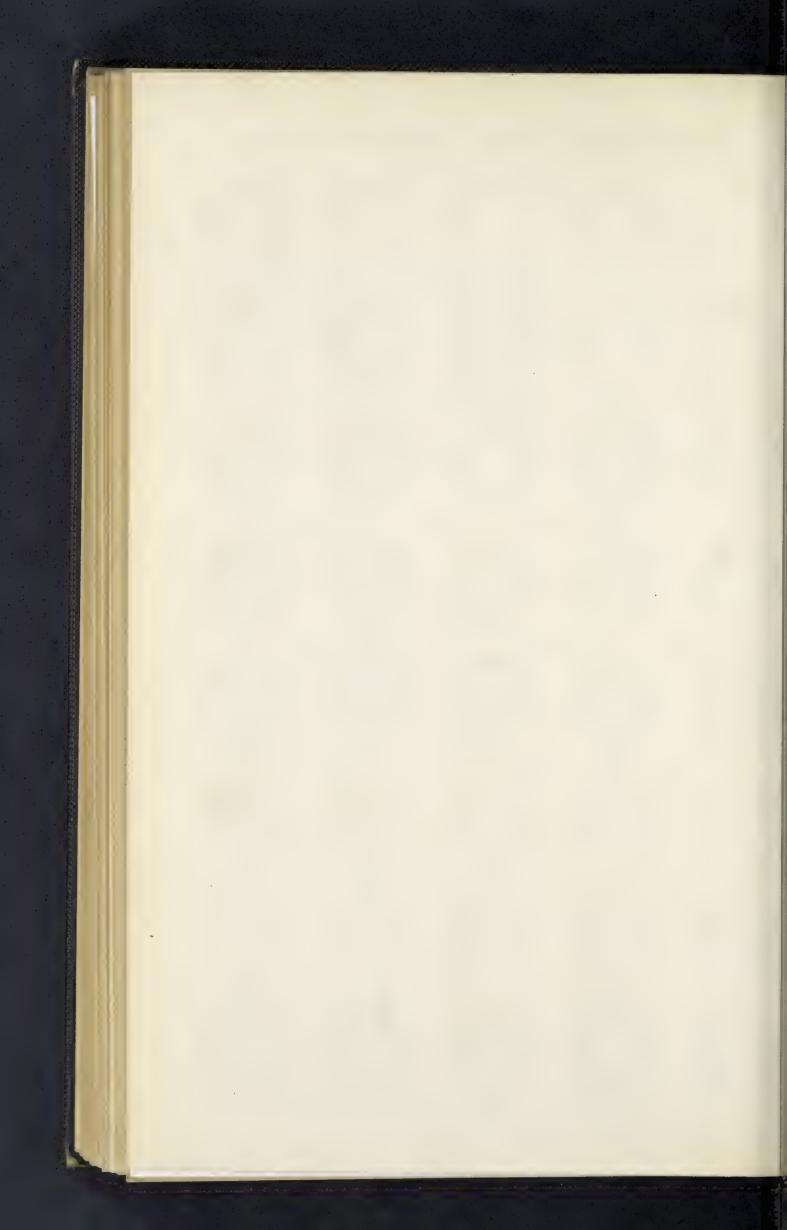












Waxed paper is the best, as it will not absorb the thinners or, better still, glass may be used, this being cut across with a diamond after the paint has been applied. It need hardly be said that the permanence of water colours is entirely different from that of oil colours. Some very useful experiments were made several years ago by Captain Abney on the permanence of water colours, and these were published in the form of a blue book. In the lists of colours which are given in the preceding chapters, the quality of permanence or non-permanence under various conditions is given in each case.

COLOURS FAST TO LIGHT.

Some colours fly or fade very quickly, while others are perfectly permanent. In the lists of mixtures under the head of "Reds," "Blues," etc., in this book, will be found a list of all the colours on the market and a note is made in each case whether the colour is permanent when exposed to light or not.

The method of ascertaining whether a pigment is fast to light is recommended by George H. Hurst in his admirable book, "Painters' Colours, Oil and Varnishes," and is as follows.

Probably the simplest method (which is a very good one) of testing the durability of colours, is to provide a sheet of unglazed cardboard; that known as Bristol board will do very well. It must have so slight an absorbent property that if any coat of paint is placed on the surface it will remain there, and not soak into the substance of the cardboard. This sheet of board is ruled into squares or rectangles measuring about 3 in. by 3 in., or 2 in. by 2 in.

A little of the colour to be tested is ground up with a little gum water into a smooth paste, and a portion of one of the ruled spaces on the cardboard painted with it. It is advisable to rule and prepare two

sheets at the same time. The name of the colour can be written either underneath the patch of colour in the square, or in a corresponding position on the back of the card. It is also advisable to grind a little of the pigment with oil, so that the relative durability as a water colour and as an oil colour can be tested.

One of the prepared cards is hung in a place where it is exposed to as much sunlight and air as possible, while the other card is placed in a drawer away from any such influence. After a week or two of exposure the cards can be compared to see if any changes have occurred; they can then be replaced in their respective positions, and from time to time compared together. Any change which may have been brought about by the action of sunlight and air on the exposed card will be observable; some colours will be changed in a few weeks' exposure, other colours require months of exposure to produce any effect.

By placing a card painted in the manner described, with different pigments in a closed cupboard, in which is placed a vessel containing some ferrous sulphide and diluted sulphuric acid, the action of sulphuretted hydrogen on the colours can be tested; if any are affected by this test it is certain that they will be similarly affected when exposed to the action of impure air.

We may now take each colour separately, following the order taken by the late Mr. W. C. Wilson, who arranged the above quoted table in conjunction with the author.

Chrome Green.—This colour is often made by the addition of a base such as barytes, but the presence of this material is not necessary. A number of different shades of chrome green are sold, usually designated pale, mid (middle or medium) and deep. The tinting strength should be tested by mixing one part of green to, say, a hundred parts of white lead or zinc, as explained elsewhere, or twenty-five parts of

lead may be used to one part of green. If it is desired to find out the relative strength for tinting purposes of the green, it can be done very simply in the following manner, but the painter must have a pair of apothecaries' scales, in order to weigh the different quantities. Take first the same quantity of the green which is being tested as that of the standard. If the colour is not so deep add more green each time, and more and more until the two samples are exactly the same tint. By comparing the weights the experimenter will have accurately the relative value of the two greens for colouring purposes. The test for body of the green is performed in almost exactly the same way as that already described for white lead. Prime a board thoroughly so that there may be no absorption, paint across the centre of it a stripe of white and by its side a stripe of black. When this is thoroughly dry take the two greens; that is, the standard and the one being Then mix both with exactly the same amount of oil and turpentine. Take a clean brush for each and paint over the black and white stripes. one which has the greatest body will, of course, hide the stripes better than the other one. The experiment is simple, and is very useful as a body tint.

Bronze Green.—This colour is usually mixed by the painter and not bought ready made, although all manufacturers make bronze greens. Quaker green is practically the same thing. The mixture usually employed is ochre, lamp black and a little yellow. The chrome should be either yellow or orange, but not lemon. Bronze greens may be made in a large variety by varying the quantities of the colours mixed and by introducing sienna, umber or Indian red in small quantities as may be required. The colour is very rich, and many cheap bronze greens consist of a considerable quantity of adulteration.

EMERALD GREEN.—This is a very brilliant green almost identical with spectrum green. It is

sometimes used where brightness is required. When ground in oil the test for purity is to dissolve it with benzine and when the dry powder is obtained to treat it with strong ammonia. It will thus entirely dissolve if pure, giving a deep blue colour.

VENETIAN, INDIAN AND TUSCAN REDS, ETC.—

These colours may be classed as the iron colours. consisting largely of oxide of iron. It should be remembered that ochres and umbers also receive their colouring from iron. Analysis gives but little information concerning the value of this group of colours. They form economical paints, especially as they spread well. The proportion of oxide of iron contained is often considered to be an indication of quality, but this refers particularly to cases where paint is to be used on iron. The tests of value to the painter are body and fineness of grinding, which may be tested in the usual way. Oxide paints are usually sold as such in three shades. A Venetian red is lighter than an Indian red, which, in comparison, should have a purplish tint. It must be remembered in this class of colours that a comparison of the same shades must be made if any useful result is to be obtained.

Tuscan Red is a mixture of Indian red with some sort of lake colour in order to secure brilliancy. This brilliancy forms an important feature of the test. Body should also be ascertained, and fineness of grinding is also important. A Tuscan red, which is coarse, may lose its richness when ground fine.

INDIAN RED.—This is shown by analysis to consist almost wholly of oxide of iron. The paler Indian red is, the greater is its tinting strength, and the rosier is the tint obtained from it by mixing it with white. Indian red should be always tested for fineness and tint.

VERMILION AND VERMILIONETTES.—Many of the imitation vermilions consist of orange red, that is, a superior red lead coloured with eosine, which is the

name of one of the coal tar colours. Speaking generally, the scarlet colours are more permanent than those having a crimson tinge. It is important to know that the tinting strength for many vermilionettes is no indication of their quality, or rather, perhaps it should be said that within reasonable limits the better stainers they are, the worse colours they will prove to be. This is because barytes or some other mineral may be substituted for the orange red and then the eosine will go farther in staining.

RED LEAD.—Every painter knows that the great objection to the use of red lead is that it will harden quickly. We recommend that on large jobs arrangements should be made with a manufacturer to supply a sufficient quantity for two or three days. It should be well ground to a thin paste in the proportion of, say, about one pound of oil to five pounds of red lead. The usual manner of painting iron, etc., in red lead is to first give a priming coat of pure lead and then a second coat of any colour desired. An excellent second coat is formed of equal parts by weight of red lead and good iron oxide. Any finishing coat may be applied.

CHROMES.

There are many shades of chrome yellows sold, the most usual being lemon, medium and orange chromes, sometimes called I, 2, and 3. The other shades are sold under various names, depending upon the manufacturer. It is advisable that the painter should always have on hand the lighter shades, as although it might appear at first sight that on mixing the deeper shades with white he would get the same result, as a matter of fact there is a considerable difference. As noted elsewhere, chromes must not be mixed with ultramarine. The pale chromes change colour quicker than the darker shades. Pale chrome should never be used on fresh plaster, although orange chromes may. In the deeper shades of chrome orange

red is sometimes used as an admixture or adulterant, but this is not a good stainer. The test for a chrome is tinting strength, taking care to make a comparison with the same grade of colours, that is, light, medium or orange chrome. Fineness is another important test. Placing a small quantity on glass and passing a palette knife over it and pressing firmly will detect grit if present. In the lighter chromes it is well to look for the greyness of tone which is objectionable. Chromes mix well with white lead and are strong in body.

OCHRES.—Analysis is of no value in determining the value of an ochre. Sometimes chrome yellow is used to tone it up. The colour is an important feature, as is also the fineness.

BLACKS.

There are a number of blacks on the market, drop black, ivory black, blue black, vegetable black, carbon black, etc. The subject of their tests is a somewhat intricate one, but its tinting strength can be readily ascertained by mixing with white lead or zinc in the manner already described. They are frequently adulterated with barytes.

BLUES.

Prussian blue must be very finely ground or it is likely to settle out. A pure Prussian blue has a rich bronze appearance when looked at from certain points of view. The tint made by mixing with white should be clear and free from any leaden or gray appearance. Some Prussian blues have a certain red or purplish cast which cannot be removed. These should be avoided, as if a purple is required it is a simple matter to add a little red to the blue to produce the desired colours. One part in a hundred of good Prussian blue gives a distinct sky blue.

ULTRAMARINE.—As explained elsewhere, this colour cannot be mixed with white lead. Where it

is necessary to make a tint, zinc white should be employed in preference.

UMBERS AND SIENNAS.

The colour should be a rich brown rather than a red cast. In siennas prepared for grainers' use, it is important that they be transparent rather than opaque. Richness and quality of tint should be considered rather than the body.

Those who are interested in testing colours are advised to purchase "Simple Methods for Testing Painters' Materials," by A. C. Wright, M.A., B.Sc. The price is 5s., and the publishers are Messrs. Scott, Greenwood and Son, 19, Ludgate Hill, London, E.C. It is a thoroughly reliable work which gives simple tests for all the principal materials used by the painter.



CHAPTER XVII.

Notes on Colour Harmony.

Perhaps the most difficult subject with which the decorator has to deal is that of colour harmony. In other words, how to use different colours in decoration in such a manner as to produce a perfectly harmonious and pleasing result. The subject is a difficult and comprehensive one, and it would be impossible within the limits of this book to do justice to it. A few general hints, however, will no doubt be of service.

It should be first recognised that there are distinct rules and laws regulating harmony in colour. Just as some people have an ear quick to recognise the slightest discord, so some are fortunate enough to possess an inherent talent for recognising colour harmony. It is to be feared that while the musical ear, so to speak, is fairly common, the ability to harmonise colours is much rarer. Speaking generally, ladies have more natural talent in matters concerning colour than men have. Possibly the reason is that they are called upon more frequently to choose and determine upon matters relating to colour in connection with their dress. It is true that if one is inclined to be satirical one might suggest that some ladies, judging by the extraordinary combination of colours they wear, must be colour blind.

It has been proved by statistics that one person in ten is colour blind, but this does not mean wholly devoid of the ability to distinguish one colour from another, but simply that there are certain colours which the person who is colour blind cannot distinguish from others.

In almost everyday work the painter is called upon to mix colours that shall harmonise, as, for instance, to paint the woodwork of a room in colours that will harmonise with the wall-paper.

MATCHING THE WALL-PAPER.—The simplest plan, and therefore the one which is usually followed, is to take the prevailing colour of the wall and to use it, usually much lightened, on the woodwork. Other colours which occur in the paper may be introduced as may be thought to be judicious. For example, if the room is a bed-chamber and the paper has a cream ground with a floral pattern printed in green with a pink flower, the stiles and rails of the doors might be painted a light green, the panels cream, and the mouldings, or a portion of them, pink. same plan may be followed successfully with many papers, but on the other hand much more pleasing and artistic results may often be obtained by using a distinct, but harmonising contrast. A single example will suffice. The writer has before him a striped wallpaper, printed in brilliant sealing-wax red, which might cause wonderment in the eyes of a novice as to how it could possibly be used successfully in an ordinary room. The excessive brilliancy might at first sight appear to be certain to produce an effect too glaring to make a comfortable living-room. Yet such a paper used in a room very soberly furnished say, with old dark oak, ebony or black walnut, would look very handsome, or in a more modern room the doors, skirting, in fact the whole of the woodwork, might be finished in white enamel, and the effect would also be very good.

CONTRASTING HARMONIES.—From this single example it can readily be seen that contrasting colours often give the very best results. A wall painted green

may look very monotonous, but if a frieze, having some bright red used liberally in it, is used in conjunction, there will be a vast difference in the appearance of the apartment.

The following suggestions for different colour schemes are by Mr. William Fourniss.

SUGGESTIONS FOR COLOUR SCHEMES.

FOR A RED WALL.—Red may graduate from Indian red to what would practically be a warm gray. Any colour going with a selected tone or tint needs to be modified so as to harmonise with it. If a wall has a paper coloured in light red and gold, and it is desirable that the woodwork should be red too, it must differ from the colour of the wall in tone and in intensity.

A CRIMSON WALL may have amber woodwork with cream coloured mouldings, or they may be heliotrope for contrast, or the woodwork may be white.

A SCARLET WALL may have light snuff brown, or a sage green, for the woodwork, with yellow green mouldings, or they may be white.

A YELLOW RED WALL, in which scarlet has been tempered with an excess of chrome, will bear a raw umber tone of brown for the woodwork, with ivory or white mouldings.

A PINK TONED WALL.—With this the woodwork may be a yellowish green, with or without straw coloured mouldings, or two shades of citrine, with pearl grey for contrast in the mouldings.

FOR A DARK RED, inclining to purple, the woodwork may be a sage or myrtle green, with amber mouldings.

A Poppy Red.—Grey green, lavender and black may be used for this.

All warm tones and shades of green or gray may be used with red, provided they get their hues by contrast with the red. Any blue associated with red must be slatey or purple in tone. If the colour of a wall-paper is heliotrope, inclined to red, the woodwork may be cream. If the heliotrope inclines to yellow, straw colour should be adopted.

BLUE

A Blue Wall of a Purple Tone.—With this yellowish orange, amber, salmon pink or terra cotta will harmonise according to the "value" of the wall colour.

A Peacock Tone of Blue Wall.—This calls for orange red, deep amber, warm brown, cool brown, or both.

A SAPPHIRE BLUE WALL.—Chocolate woodwork in two tones, with amber mouldings. Pearl grey and cream will go with this colour.

A WALL OF AN ULTRAMARINE TONE.—Light warm grey and cool yellow brown go happily with this.

A NEUTRAL BLUE WALL will unite with citron and chocolate, or a warm grey green, or a blue green grey, and salmon.

A SLATE COLOURED WALL OF A BLUE TONE.—For this there is plum colour and lavender, puce and orange to choose from.

YELLOW.

This colour ranges from a rich sienna to a lemon tone; from citrine to a cream.

A YELLOW WALL.—Plum colour, slate, brown, or citrine may be used with this.

A GOLD COLOURED WALL.—The woodwork may be in two tones of lavender, with citrine mouldings.

AN ORANGE COLOURED WALL.—The colour for the wood may be a purple tone of red, with maroon mouldings, or if light mouldings be required, citrine would serve.

A CANARY COLOURED WALL.—Vellum colour, with deep ivory mouldings, may be adopted for the woodwork.

A DEEP TERRA COTTA WALL.—A selection from buff, sage green, Indian red, vermilion, white and black

either or any, may be selected, the strong colours in

the small parts.

A PRIMROSE TONE OF WALL.—Tones of snuff brown, medium yellow green, and lavender may be selected.

A NEUTRAL OR DRAB WALL.—Shades of olive green, Venetian red, and lilac go well together.

Brown.

This colour is perhaps the best wearing colour for woodwork. There are infinite tints and shades, from sober to rich, from cool to warm. Blue agrees especially with brown.

Deep brown, light blue, and gold go well together.

LIGHT PURPLE TONE OF BROWN WALL.—The
woodwork may be yellow red, with cream mouldings.

A Brown Ingrain Wall.—The woodwork may be in two tones, made from indigo blue, with amber mouldings.

A GOLD COLOURED BROWN WALL would unite with woodwork of a red tone of purple, with plum coloured mouldings, or a warm grey may be used.

BURNT SIENNA BROWN TONE OF WALL.—With this, salmon and myrtle harmonise.

GREEN.

This colour, so extensive in Nature, will agree with all colours, provided they are toned to suit each other, warm or cold, neutral or bright, etc.

An Olive Green Wall will agree with maroon woodwork with a crimson lake, straw or pink tone for

the mouldings.

A MEDIUM GREEN COLOURED WALL.—If two tones of red, a crimson tone and a yellow tone be adopted, the mouldings, if desired, may be a salmon buff.

A GREY GREEN WALL may have a primrose tone of woodwork, with a scarlet tone for mouldings.

A Moss Green Tone of Wall will associate well with citrine woodwork, and salmon coloured panels or mouldings.

A PEA OR LEAF GREEN WALL goes well with a chocolate and a lavender.

GREY.

This neutral colour agrees with and helps every other colour.

A WARM GRAY WALL.—With this the woodwork may well be a tawny leather colour, with either buff or cream in the mouldings. A quiet red would also suit.

A SILVER GREY WALL sympathises with a salmon colour, as well as with a deep blue. Should there be blue and red in the pattern on the paper, the styles of the woodwork could then be a delicate raw umber tone of brown. The mouldings the same brown, with burnt sienna added to it. The panel may be a cameo pink. A snuff coloured brown would also come well.

A DRAB TONE OF WALL, having an ornament upon it, low in tone, a citrine for instance, would need some force in the woodwork. A rich burnt sienna brown suggests itself for this, with a reddish brown for the mouldings.

Of course, these schemes of colour can be reversed. Should the general tone of the wall-paper be that tone suggested here for the woodwork, it takes then the colour of the paper.

COLOUR COMBINATIONS FOR DOORS.

Excellent results may be obtained in painting front and other doors in rich contrasting colours or in self-colours, *i.e.*, a dark colour for the frame of the door and a tint of the same colour for the panels.

The following combinations are recommended as producing very good effects. They were carried out

in doors prepared by Messrs. Lewis Berger and Co., Ltd., for some of the conventions of Master House Painters and Decorators.

z dilitoro dila D	ccorators.	
FRAME.	MOULDING.	PANEL.
Yellow, Bronze and Golden Ochre.	Carriage Green.	Yellow, Pale Bronze.
Homerton Red.	Carriage Green.	Maroon Brown.
Mid. Japan Brown.	Maroon Brown.	Deep Japan Brown.
Vienna Lake and	Maroon Brown and	Beep Japan Brown.
Pompeian Red	Black.	Coronation Red.
Mid. Japan Brown.		
(reduced $\frac{1}{15}$).	Deep Japan Brown.	Mid. Japan Brown.
Verona Blue.	Maroon Brown.	Vernon Blue and White-
Coronation Brown.	12 32	Coronation Orange.
White Japan.	,, ,,	"
Deep Japan Brown (reduced).	Deep Japan Brown.	Berger's Purple.
Emerald Tint S.	Olive.	Emerald Tint W.
Purple	Maroon Brown.	•
Maroon Brown.	Homerton Red.	Homerton Red.
White Japan.	Gold Lined.	White Japan.
Cream.	Green.	White.
Hedge Sparrow Egg		
Tint.	Stone Colour.	Old Gold.
Japanner's Brown Mid. 37.	Same Brown Deep Shade	Japanner's Brown, Mid. 37.
Japanner's Brown Mid.	Maroon Brown.	Japanner's Brown, deep.
Purple.	Pompeian Red (reduced.)	Pompeian Red, permanent.
Homerton Red.	Homerton Red.	Maroon Brown.
Homerton Green.	Yellow Bronze Green.	Homerton Green.
Verona Blue.	Verona Blue (reduced,	v. Verona Blue (further reduced.)

CHAPTER XIX.

THE PROPORTIONS OF MATERIALS, NOTES, ETC.

A little consideration will make it quite clear that it is impossible to give exact proportions of materials necessary to produce a paint that will suit every job. These proportions are determined by the condition of the work. A new door of good sound pine will be treated differently to one made of an inferior wood, which is knotty and somewhat sappy. Again, a door that has been exposed to the weather for some years, and from which the paint has, perhaps, almost wholly departed, will require a different mixture to a front door from which the accumulation of old paint, extending perhaps, to over one hundred years, has been burnt off. Precisely in the same way as patent medicines cannot be safely used for any and every complaint, so it is impossible to have paints that will suit any and every purpose. In one case the doctor is consulted and he takes into consideration every symptom and every condition and acts upon his diagnosis or scrutiny of symptoms. like manner the decorator takes note of every condition of his work, and prepares his paint accordingly. Again, iron would not be painted with the same mixture as wood. Still, if we cannot give exact proportions, we can, at least, give some information on the subject, which will form a guide and give some data for the reader to work upon. These we will give under separate heads

Priming for Iron.—The usual plan is to use red lead mixed with linseed oil, the proportion required being about fourteen pounds of linseed oil to every hundredweight of lead. The second coat should be equal proportions of red and white lead mixed to a proper consistency with linseed oil. Sometimes oxide

of iron paint is used instead of red lead.

PAINTING ON STUCCO.—The priming must contain a considerable quantity of oil because of the absorbent nature of the stucco, and it should have a big proportion also of turpentine. Four gallons of boiled oil to a hundredweight of red lead and three quarts of turpentine will usually answer. The second coat should be an equal mixture of red and white lead with a smaller proportion of turpentine and oil.

PRIMING FOR DEAL OR PINE (INSIDE). -With white lead use three-quarter ounces of driers and the same quantity of red lead to every pound of lead. Thin with three-quarter gallon of raw linseed oil to 14 lb.

of lead.

SECOND COAT (INSIDE).—Use about half an ounce of driers and one ounce of red lead to every pound of white lead; 14 lb. of lead will require half gallon raw linseed oil and quarter gallon turpentine.

SECOND COAT (OUTSIDE).—Use about one ounce of patent driers to every pound of white lead, with the addition of about the same quantity of red lead.

THIRD COAT.—Use to 14 lb. of lead, quarter gallon each of raw linseed oil and turpentine and quarter pound driers.

TABLE OF MATERIALS REQUIRED.

The following table is extracted from a more elaborate one to be found in the "Painters' Pocket Book," by Peter Matthews, published at 3s. nett by John Heywood, Ltd., Deansgate, Manchester.

On absorbent surface, such as new plaster and stone. Based on the assumption that 10 lb. of white

PLATE XII.

SPANISH MAHOGANY.

GREEN.

SPANISH MAHOGANY.

SILVER GREY.

Examples of "MATSINE" on Painted Surfaces.



lead mixed with driers and thinners will cover 40 square yards.

` `			•										
Sq. yd.	White Lead. cwt. qr. lb.			Patent	Linseed Oil. gal. qt. pt. gil.				Turpentine.				
5			$I_{\frac{1}{4}}$		$2\frac{1}{4}$		1	F	$I_{\frac{1}{4}}$	8****	9.	pt.	gil.
10			$2\frac{1}{2}$		4 \frac{1}{4}			,	2 =				3
20			5		$8\frac{3}{4}$			Ī	$0\frac{3}{4}$				14
50			$12\frac{1}{2}$	I	53		I	0	$3\frac{3}{4}$				2 1
100			25	2	$II_{\frac{1}{2}}II$		2	I	3卡			T	2년 2년
500	I	0	13	13	$8\frac{3}{4}$	3	2	I	013		3	0	~4 I =
1000	2	0	26	27	$I^{\frac{1}{2}}$	7	I	0	$I^{\frac{1}{2}}$	I	2	0	2 2 3 3

TABLE: When 10 lb. of white lead with driers and thinners will cover 60 square yards (as on old painted work, or after second coat on new work).

Sq. yd.	WI cwt.		Lead. lb.		Patent lb.	Driers,	ga!.	Linsee qt.	d Oil,	gil.	Tu:	rpenti pt.	
5				I 3 4		$I_{\frac{1}{4}}$	3	-1	P	1	q.	Dr.	gil.
10			I	10		2 1/5				2 3			4 1
20			3	5 <u>±</u>		$4\frac{3}{1}$				1 3 1 3			<u>2</u> 3
50			8	5 1		12			I	0 ½			1 1
100			16	10	ı	8		I	0	I 3/4			2 ± 2
500		2	27	5 4	7	$2\frac{1}{4}$	I	I	I	$3\frac{1}{2}$	T	0	$\frac{2}{3\frac{3}{4}}$
1000	I	1	26	$10\frac{1}{2}$	14	$4\frac{1}{2}$	2	3	1	3	2	I	3 ³ / ₄

EGGSHELL GLOSS.—To every pound of white lead add quarter of an ounce of copal varnish and to same quantity of gold size with half the quantity of boiled oil. These will serve the purpose of binding the materials together and causing them to dry. The thinners should consist of turpentine used in the proportion of about three-quarters of a pint to every 7 lb. of white lead.

Oxide of Zinc.—In mixing oxide of zinc it is necessary, as already mentioned, to use a special drier free from lead. Special zinc driers may be purchased ready made. They consist for the most part of borate of manganese.

Outside Woodwork.—To every hundredweight (112 lb.) of zinc oxide ground in oil as usually supplied use 19 lb. of refined boiled linseed oil, $5\frac{1}{2}$ lb. of turpentine, and 5 lb. of zinc driers. A smaller quantity of driers will frequently suffice.

Inside Woodwork.—Use rather more refined boiled oil and a little more driers.

These mixtures may be employed in varying proportions of oil and driers on stone, plaster and iron, and the quantity of turpentine will rarely require to be changed.

PIGMENTS.

Some Useful Tables.

PIGMENTS LIABLE TO CHANGE UNDER THE INFLUENCE OF SULPHURETTED HYDROGEN, AIR, AND MOISTURE:

Yellow.—Chrome yellow, mineral yellow, Naples yellow.

White.—Chremnitz white, flake white, pear! white.

Red.—Red lead, purple red, iodine scarlet.

Green.—Verdigris, Scheele's green, emerald green, mountain green.

Blue.—Prussian blue, Antwerp blue.

Orange.—Orange chrome.

PIGMENTS LITTLE LIABLE TO CHANGE UNDER THE INFLUENCE OF SULPHURETTED HYDROGEN,
AIR AND MOISTURE:

White.—Zinc white, constant white, tin white. Red.—Vermilion, red ochre, Indian red, madder lakes.

Yellow.—Yellow ochre, barium chromate, zinc chromate, aureolin, raw sienna.

Green.—Chrome green, cobalt green.

Blue.—Ultramarine, smalt, Thenard's blue.

Brown.—Vandyke brown, raw umber, burnt umber, manganese brown, sepia.

Black.—Ivory black, lamp black, Indian ink, graphite.

Orange.—Orange vermilion, burnt sienna.

PIGMENTS LIABLE TO DETERIORATION WHEN IN CONTACT WITH WHITE LEAD, CHROME OR OTHER LEAD PIGMENT:

Yellow.—Yellow orpiment, king's yellow, Indian yellow, gamboge.

Red.—Iodine scarlet, cochineal, carmine.

Orange.—Golden antimony sulphide, orange orpiment.

Green.—Sap green.
Blue.—Ultramarine.

PIGMENTS WHICH ARE LITTLE AFFECTED BY HEAT, AND WHICH MAY BE EMPLOYED WHEN THE MATERIAL HAS TO STAND FIRE:

White.—Tin white, barium white, zinc white.

Red.—Red ochre, Venetian red, Indian red.

Yellow.—Naples yellow, antimony yellow.

Blue.—Smalt and royal blue, ultramarine.

Green.—Chrome green, cobalt green.

Orange.—Burnt sienna, burnt ochre.

Brown.—Burnt umber, manganese brown.

Black.—Graphite, mineral black.

COLOURS THAT MAY BE USED WITH LIME:

White.—Permanent white, i.e., baryta white, gypsum, zinc white.

Red.—The vermilions, light red, Venetian red, Indian red, madder lakes.

Orange.—Cadmium, orange chrome, Mars orange, burnt sienna, burnt Roman ochre, light red.

Yellow.—Aureolin, cadmium yellow, lemon yellow, Naples yellow, Mars' yellow, raw sienna, yellow ochre, Roman ochre, transparent gold ochre, brown ochre, Indian yellow, Oxford ochre.

Green.—Oxide of chromium, transparent oxide of chromium, viridian, emerald green, malachite green, verdigris, terra verte, cobalt green, chrome green.

Blue.—Genuine ultramarine, artificial ultramarine, new blue, permanent blue, cobalt blue, cerulean blue, smalt.

Purple.—Purple madder, Mars' violet.

Brown.—Bone brown, bistre, Prussian brown, burnt umber, Vienna brown, Vandyke brown, Cologne earth, asphaltum, Cassel earth, manganese brown.

Citrine.—Raw umber, Mars' brown.

Blacks.—Ivory black, lamp black, blue black, charcoal black, cork black, Indian ink, black lead, drop black, plumbago.

BRUSHES.—We include here some information concerning brushes, but may first give a brief description of the way in which they are made, taking the firm of G. B. Kent and Sons, Ltd., as an example, as the author had the pleasure of going over their factory some time since. The following is his account written for the *Decorator's Magazine*.

A superficial observer may be inclined to think there is no particular advantage to the painter and decorator in possessing a knowledge as to how the tools he uses are made. Yet such a knowledge may help him considerably in judging as to the quality of those tools, and it will be at once acknowledged that an ability to discriminate in this respect is of considerable value. For brushes vary greatly in quality, far more so, perhaps, than our readers may imagine possible. Everyone knows that there are good brushes that cost more than a trifle, and rubbishy goods, chiefly of foreign make, that can be bought for, perhaps, half the amount. Probably there is not a reader who does not fully understand that it is far better in the end to buy the best quality brushes, that is, that it is cheaper to pay a higher price, because the work with such brushes can be done quicker and better than it can by the inferior ones, and also because the superior quality lasts much longer. Those things are well understood

among most painters, and even if some of them will use cheap stainers and lose money in consequence, they have, at least, learned a lesson of the necessity. of using only best quality tools.

But it is not a comparison between high grade and low grade brushes that we now want to make, it is rather to direct attention to the difference that exists in the actual quality of so-called first class tools of different makes. It is this difference that can best be understood after inspecting the process of brushmaking, and it must be acknowledged that adulteration can be carried on in the manufacture of brushes to a considerable extent. Take a common ground brush as an example. The actual brush part should consist wholly of hog's bristles, for there is nothing yet discovered that gives better results. Yet there are on the market many brushes marked "pure bristle," which really contain more or less a large proportion of horsehair or other material which makes a poor substitute, but which cannot be easily detected, in fact, it is the difficulty of detection which has probably given rise to the objectionable adulteration referred to.

The objection to horsehair in a painter's brush is that it is flabby and without spring, but its presence in adulterating brushes can be understood when it is said that approximately the price of horsehair is 1s. 9d. to 2s. 2d., and bristles 8s. to 9s. per pound. It certainly requires an expert to state positively whether horsehair is included or not, but there are certain signs that with care, will determine the matter, at least to a certain extent. The real bristle has its end splitcalled a "flag" end—the root end is considerably larger and cannot be mistaken. The spring or elasticity is another indication of the bristle. The horsehair, on the other hand, is the same both ends, and has no flag end; if the suspected bristles be viewed under a strong reading glass the difference can be told without a great deal of difficulty.

At the works of Messrs. G. B. Kent and Sons, Ltd., the author was shown how suspected brushes sent out had been dissected and the various parts divided up, and it was surprising to see how much horsehair could be included in a brush without giving it any out-of-the-way appearance. There were little piles of horsehair of different lengths, while the bristles were all sorted into other piles, each of different lengths. Photographs of the brushes that have been dissected in this way proved of use in showing painters that adulteration in brushes is carried on to almost as great an extent as it is in paint materials. No adulteration whatever in painting brushes is permitted in the standard quality of G. B. Kent and Sons, Ltd.

Certainly the brush department in any brush manufactory which is of the most importance is the bristle room, and it was to this that the author was There were bristles of many different first taken. kinds, most of them tied up into neat bundles ready to be afterwards dealt with. For instance, Siberian Okatka, and perhaps most important to my readers because they make the best paint brushes, having an excellent spring and being stiff. They are very costly, and are rarely used by themselves, nor is it necessary because other varieties of bristles may be mixed in, and it is this mixing or blending that constitutes so important a part in the brush manufacturer's art. Indeed, the purchase and blending take years of careful study to learn. One class of bristle is introduced into the mixing to give strength, another straightness, another solidity, another colour, and it is the judicious blending, the knowledge of which is acquired only by much experience, which makes a first class brush for first class work, and having the requisite spring and durability and the band of which will not burst.

The process of dividing the bristles into uniform lengths is termed "dragging," a very interesting process

which requires considerable expertness on the part of the operator. A handful of bristles, after being mixed, is placed against a gauge, and the operator, grasping firmly those bristles which project beyond a mark which indicates the required length, withdraws them with his thumb and finger and places them aside. The whole bundle having been gone over in this way, a second dragging to the next mark is made, and so on until the bristles are arranged in little piles of uniform lengths.

The operation of "mixing" is also interesting. This is done in order to obtain a uniform colour and quality in the bristles. First, all the bristles of different colours are piled on the top of one another, varying considerably in colour in the different layers, from top to bottom. Perhaps there will be one layer nearly white and another nearly black. If these were all mixed up indiscriminately to make a brush, the result would be a very patchy appearance that would not be liked. The object, therefore, is to have an equal admixture of black and white throughout. A workman takes in his hand a portion of the bristles from top to bottom, cutting through all at once. These he holds in his two hands and "jabs"—for the want of a better word—through a steel comb which is fixed upright before him. This mixes the different coloured bristles and at the same time pulls out inferior or woolly parts that may have been left in. As each handful of bristles is dressed in this way it is laid aside, and when the whole is completed, the second dressing is gone through in the same way as the first, the result being that the admixture is perfect, and the appearance of any one part of the pile is exactly the same as that of the other. It is essential also that all the bristles should lie the same way, and, as in the rough an uncertain small proportion of the bristles arrive with their heads the wrong way, to extract them, another small comb, termed an "engine," with teeth very close together, is used; the "flag" end of the handful is combed over this, and the roots of the "turned" hairs catch in the comb.

It will be unnecessary to describe in detail how every brush is made, but an ordinary ground brush will serve as an example. The actual manufacture is not difficult. First, the bristles are carefully weighed out so that every brush of the same grade has exactly the same quantity of bristle in it as a corresponding brush; great care being taken not to disturb the way in which the bristles lie. They must all point one way, and naturally they have a certain bend. outside of the brush is usually made of white bristles, while the inside is grey and vellow. This is almost a universal rule, for although the inside bristles are of equal spring to those outside, still trade demands white bristles outside and has them. The reader will understand that the bristles that are to form the ground brush about to be made are lying on the scale, these having been weighed they are taken off, the white bristles being underneath, so as to form the outside of the brush. The workman takes all the bristles carefully, but firmly, in both hands, and turns the bristle round his thumb in such a way that the bend of the bristles all turn inward towards the centre, and the white bristles or "cappings" lie in an even rim round the rest, and the "knot" is then tied round with string. The knots are then dipped in hot cement and kept warm, standing upon a hot plate.

The next process is "driving," which consists in forcing the handle through the bristles, which has been previously inserted in its binding, and this tightens the brush by compression.

Varnish brushes, as a rule, are shaped in a manner somewhat similar to the method of making artists' pencils, that is to say, the wedge shape is produced by placing the bristles into a small circular box, the bottom of which is concave. Hence, it will be seen

that the bristles, if even they are all of the same length have the necessary chisel edge for a varnish brush. After the brush is made, the bristles are thoroughly scoured on a stone with soap and water. After the brush is finished, the bleaching chambers are reached where, by means of sulphurous fumes, the bristles are bleached to the required degree of whiteness.

The Care of Brushes.—However good a brush may be it will soon be ruined unless it is properly treated when out of use. The following hints will suffice as a guide in this respect:—

Writing Pencils, etc.—Wash in turpentine until quite clean, and if they are not to be used for some time, dip in olive oil and smooth from heel to point.

Stipplers.—Wash thoroughly in pure soap and hot water, rinsing with cold water. Place point downward to dry.

Varnish Brushes.—The best method of keeping varnish brushes, in the opinion of the author, is to suspend them in the same description of varnish as that they are used for. As this is not always possible, boiled oil may be used instead.

Paint Brushes.—Mr. Ernest N. Kent gives the following instructions in "Specifications":—

Brushes made for Use in Colour should first be soaked well in water to swell the bristle in the binding. This applies also to whitewash brushes which are bound either by wire or leather.

A Brush after use should be thoroughly cleansed out in turps or soap and water. If left in water any length of time they are liable to twist, and the bristles lose their elasticity.

A Brush made for Paint should not be used in varnish, the spirit of which dissolves the cement with which it is set, and loosens the bristles. When a ground brush has been well worn down in colour, it may, however, be used in varnish.

Varnish Brushes when not in use should be suspended in either varnish or oil, the brush not resting on the bristles. No brushes should on any account be kept in turpentine.

Stippling Brushes should be well cleansed and dried after use, the bristle being carefully kept from crushing; a box in which they can be slid, allowing the bristle

to hang downwards is recommended.

Should a Brush become quite hard with Paint it should be soaked for twenty-four hours in raw linseed oil, after which time in hot turpentine.

THE TINTOMETER.—Many attempts have been made to devise an instrument by which records of colours can be registered with accuracy. The nearest approach to success in this direction is the tintometer, which is described as an instrument for the analysis of accurate measuring and recording of all colours. It is an invention of Mr. J. W. Lovibond, of Salisbury, and is largely used not only by colour and dye manufacturers, but in many other industries. By its use a colour manufacturer can dispense with keeping a sample of every colour he makes. Provided that the customer possesses a Tintometer, and the colour manufacturer one also, it is the simplest matter for an order to be sent simply by numbers which will ensure complete accuracy of shades. The instrument consists of a double tube, ending in an eye-piece at one end, and in equal apertures for viewing the colour to be measured, and the glasses which are used as measures at the other end. These glasses are coloured in various degrees of intensity, and in even gradations ranging from almost white to strong colours in red, yellow and blue respectively. In the whole coloured glasses are supplied with the instrument, but it is so very rare indeed that so large a number is required, and, as a rule forty or fifty glasses or even many less will answer all purposes. It will be understood that the colour which is to be measured or recorded is placed on one side of the double tube, on the other side is put one, two or three glasses which are changed until a perfect match is obtained. A note of the numbers of the glasses thus records the matched colour. The instrument is a great success, and permits of the colour analysis of pigments.

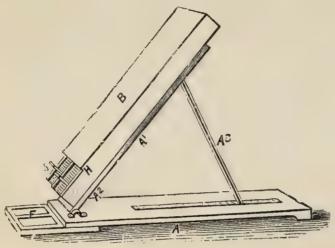


FIG. 12.

Fig. 12 shows the arrangement for measuring colour in opaque objects. The optical instrument B fits into the shoe at A, the bottom of which is commanded by both tubes of one instrument. Under one side at F is placed the opaque substance to be measured, and under the other the standard white, for reflecting the beam of white light, which is then dissected at J by the suitable standard glasses, as already described for transparent colours.

Coloured Oil Varnishes.—Spirit varnishes made in various colours are familiar enough to decorators, but they are not very durable. A series of coloured oil varnishes are manufactured by Messrs. Lefranc and Cie., of Paris (London office, 27, Fetter Lane, E.C.), which are very useful for various purposes. For example, they may be used on such woods as bird's eye maple, chestnut, etc., with excellent effect, as the beautiful lights in the wood show up to advantage through the varnish. They are also used for glazing.

especially the red colour, which on a ground of bright coloured oxide, shows up well and does away with the necessity for using fugitive crimson lake.

Oxides.—The oxide of iron paints which are so useful and economical for the use of house painters depend to some extent for their durability upon the proportion of ferric oxide which they contain. Even more important is the fineness of the pigment and the colour or tone. The writer has examined some Indian reds and a special Turkey red made by the Derby-Oxide and Colour Co., Ltd., Rugeley, Staffs, which may be taken as typical oxides of a high quality.

JELSTONE.—This is a product of the Alabastine Company and is now used by many of the most enterprising tradesmen in place of distemper, as usually made with whiting and size. As the object of the Company is to compete with whiting and size, they have necessarily placed the price low, and this being a perfectly white dry powder and only requiring cold water to mix (which is free), as against whiting and size, which is always purchased with a percentage of water which you pay for, it is obviously important that our readers should consider this view which the Company take. The saving of time and waste as compared with the ordinary preparation of distemper, and its convenience, also its absence of odour in hot weather, also that ordinary colours may be added to the white, are points which should be kept in mind.

DESCRIPTION OF COLOUR PLATES.

PLATE I.

This plate, which faces the title page, is prepared in order to show the result of adding white to various colours in given proportions. All the colours shown on this sheet are manufactured by Messrs. Lewis Berger and Sons, Ltd., of Homerton, London, N.E. The colours are shown pure with tints of the same colour side by side, produced first by tinting with

fifteen parts of white lead and next with thirty parts of white lead. The reader is strongly advised to carefully study this sheet, particularly the tints, so that he may have well in mind the appearance of the different colours when white is added to them. An excellent plan would be to compare the self-colours in daily use with those shown on this sheet, and then to mix the same number of parts of white lead, again making a comparison. Most of the colours shown on this sheet are referred to under their respective heads.

On application to Messrs. Lewis Berger and Sons, Ltd., a book containing 110 self-colours and tints will be forwarded, free of charge, to readers who mention this book in their application.

PLATE II.

On this plate are shown the principal grounds used in graining. They are given in flat colours so as to better indicate the exact tones. It must be said, however, that opinion among grainers varies con siderably as to the exact shade or hue the ground of principal woods should have. Those given on this sheet may be taken as average examples, but they may be somewhat varied without detriment if a corresponding variation is made in the graining colour.

In chapter XIII. will be found instructions for producing each of these graining grounds as well as the graining colours which should be used over them.

Eight colours in everyday use are also shown on this sheet.

PLATE III.

Sixteen examples of different colours of paint are shown on this sheet. In each case paint, and not printers' ink, has been used in their production, so that no difficulty should be experienced in imitating them. Instructions for mixing the colours will be found under the various heads, such as "Reds," "Blues," "Greens," etc. The reader has only to

turn to the name of the particular colour in order to get the correct mixture.

PLATE IV.

On this plate are shown thirty of the sixty standard colours issued by Messrs. Pinchin, Johnson and Co., Ltd., of 23, 24 and 25, Billiter Street, London, E.C., as a result of a competition which is described on page 22. The thirty additional colours are included on Plate V. The reader should remember that while these colours do not necessarily accord in certain cases with their own ideas of what any particular name may be, that they have been selected as a result of the concensus of opinion of some three thousand different decorators and colour experts. It should also be borne in mind that inasmuch as one name is as good as another for a colour provided that the name is fixed rigidly, that a convenient plan is to adopt Messrs. Pinchin, Johnson's standard colour and to work upon it as a base. It should also be added that this firm have made a practical application of the standard colour card by making it the base of a new paint they have recently issued under the name of "Minerva Paint," which is ready prepared for use. They have selected from their standard colour card twenty different colours, namely, the following: Lemon chrome, middle chrome, orange chrome, signal red, carnation red, yellow ochre, raw sienna, burnt sienna, light purple brown, mid. purple brown, maroon, burnt umber, emerald tint, light Brunswick green, mid. Brunswick green, dark Brunswick green, mid. bronze green, ultramarine blue, Prussian blue and black, and make "Minerva Paint" with these twenty standard colours. Now inasmuch as a painter can very readily produce tints by adding white to any of these colours and can so obtain a large series of different tints, the firm have issued an exceedingly useful colour card which gives samples of the twenty colours above mentioned and underneath four rows of tints made from

the same colours, having been reduced with three parts, seven parts, fifteen parts, and thirty-one parts of white respectively. This colour sheet will be sent to any reader of this book who writes to Messrs. Pinchin, Johnson and Co. at the address above given.

PLATE V.

This plate shows thirty additional colours named in the competition referred to in the above description.

PLATE VI.

This plate is prepared to show the effect of varnishing a water paint. All of the samples are Hall's Sanitary Washable Distemper, manufactured by Messrs. Sissons Brothers and Co., Ltd., of Hull, and the numbers are appended for the convenience of ordering. In chapter XV, will be found a reference to the use of water paints and the method of varnishing. The varnish may be applied direct to the distemper if desired, and in that case it will darken it considerably. This is sometimes an advantage as when finishing a room in washable distemper it is desired to form a varnished dado. If it is wished to varnish the surface but retain the colour a coat of size will effect this, as shown in the plate.

PLATE VII.

Another water paint of considerable merit, but of a different character, is shown in various selected colours on this plate. It is mixed with hot water and gives excellent results, both when used inside and outside. The distemper in question is called "Phasantite," and is manufactured by Messrs. Wilkinson, Heywood and Clark, Ltd., Caledonian Road, London.

PLATE VIII.

This plate shows sixteen different examples of Messrs. Wilkinson, Heywood and Clark's beautiful non-poisonous decorators' colours. The advantages of using these colours from a sanitary, as well as an artistic point of view, are very considerable. Effects

may be obtained by their use, difficult to arrive a without very considerable trouble when using othe materials. A point which the practical reader wil readily grasp is the facility with which reduced tint may be obtained by the addition of Paris white Indeed, almost numberless tints may be obtained from the complete set of colours as shown in Messrs. Wilkinson, Heywood and Clark's handsome sample book, which the author has arranged will be sent to purchasers of this work, on application to them at 7, Caledonian Road, King's Cross, London, N. sixteen of these colours are used in the illustration.

PLATE IX.

This plate is worthy of very careful study because it shows in a very practical manner how forty different colours, shades or tints may be obtained by mixing together various proportions of red, blue, yellow and white. These primary colours are marked on the plate "31," "A," and "B" respectively. All the colours are made from the well known distemper alabastine, which possesses great merit and has a very large sale among decorators. The proportions for producing all the colours shown on Plate IX. are given below, and it is suggested elsewhere that anyone desirous of learning colour mixing would spend his time very profitably by mixing up these colours, as the results obtained would lay a foundation for a good practical knowledge on the subject. A practical house painter will readily see another advantage, which is that instead of stocking forty different colours he only has to stock four, including the white, as from these he can so readily obtain all the others.

Before giving the proportions that should be used to produce each tint, it may be well to remark that when Alabastine is floated freely, one coat is sufficient on most walls, but where there is much suction, preparation of the surface as per instructions given is necessary. The Alabastine is supplied in dry powder, the proportions are mixed according to rule, and as shown in the list which follows. The actual mixing is effected with the dry colours, cold water is then added, and after stirring, the material is ready for use. A beautiful surface is thus readily produced.

Referring to the numbers marked against each tint on Plate V., the following are the proportions that are to be used. A convenient way of measuring the material is to use an ordinary tea-cup, but care must be taken to pour in the Alabastine lightly in each case. If the cup or measure is knocked on the bench so as to cause the material to pack, it will, of course, hold more than it would do otherwise, and if it is packed in one case and not in another, the colour will not come out as intended. The reader is recommended to use a tea-cup or similar measure, and to put the material in, as far as possible, in each case in the same way. All the colours shown on this sheet are stippled, this giving a more artistic result than can be obtained by brushing out.

Proportions of Materials for Producing Colours shown on Plate IX.

No. of Colour.	White	31	В.	A.	No. of Colour.	White.	31	В.	A.	No. of Colour.	White.	31	В.	A.
62 63 64 65 66 67 68 69 70 71 72 73	6 5 8 4 4 - 8 4 6 10	I 4 5 1 2 6 I — — — — — — — — — — — — — — — — — —	1 2 3 1 1 2 2 2	I 3 4 — I 3. I I I O 1 1 — —	74 75 76 77 78 79 80 81 82 83 84 85	-6 5 2 10 - 10 8 4 8 2	1 2 3 2 ½ ¼ I I I 3 2	3 4 3 4 4 4 4 5 4 5 4 5 1 5 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 1 2 1 5 I	86 87 88 89 90 91 92 93 94 95 96 97 98	8 6 10 10 	1 1 2 2 1 5 4 — I	I 1 ½ 1 1 4 4 1 3 2 2 3 4 1	1 2 4

PLATE X.

This plate gives twenty-seven different colours of Church's Alabastine, including the three (A, B, and 31) primary tints shown on Plate IX. The manufacturers recommend that shades 5, 6, 7 and 34 are best in one coat work on prepared walls, and that two-thirds white Alabastine should be added for the first heavy coat. A careful study of this plate is also recommended.

It may be added that Alabastine has many uses in addition to that of a distemper. It may be used most successfully as a hard filler for bringing work to a level surface; as for example, under white enamel work. It is also employed in the following manner to produce varied novel effects, but the ground is prepared with Alabastine of say, for example, a deep red colour similar to 31. Upon this is given a thick coat of white or lighter colour, and while the last coat is still wet, it is combed with a coarse grainers' comb with a wavy motion. This removes some of the white and shows the red beneath, giving a very pretty effect. The comb may be moved, of course, in any direction, the example may be employed so as to produce scollops or in a hundred and one different ways which would occur to the ingenious reader. Further variety may be given by placing the end of a fairly large brush against the wettop coat and giving it a twisting motion which will form something of the nature of a rosette. A thicker variety of the same material suitable for modelling and high reliefs is manufactured by the same firm and is called "Alabastine-Opalia."

PLATE XI.

This plate shows forty specimens of typical water colours manufactured by Messrs. Reeves and Sons, the well known firm of artists' colourmen, whose headquarters are at Ashwin Street, Dalston, N. The plate will be very useful for reference in connection with the chapter on artists' water colours, and readers

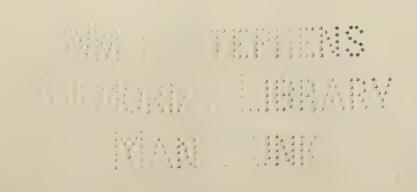
are advised to compare these water colours with the specimens of oil paints which are contained in this book. They will then get an accurate idea of the difference of appearances between a pigment ground in water, and one ground in oil. It should further be observed that artists' colours are, as a rule, of a much higher grade than house painters' oil colours, and are correspondingly more expensive. It will be observed that the specimens are produced in such a manner that both a thin and a thick wash is given so that the difference in appearance can be accurately gauged.

PLATE XII.

This plate gives four examples of "Matsine," a coloured material manufactured by Messrs. Mander Brothers, Wolverhampton. It is mentioned under the head of "Glazing" on page 96, to which the reader is referred. "Matsine" is made in thirteen different colours and by varying the grounds literally hundreds of different effects may be produced. The effect of applying silver grey over a white ground as shown at the bottom of this plate is very beautiful and most useful in many places where colour would be objectionable.

PLATE XIII.

This plate shows four more examples of "Matsine" above referred to and also under the head of "Glazing" on page 96. The imitation of light oak on the plate is much truer to Nature than many elaborated examples the writer has seen which have probably taken as many hours to perform or one might say, days, as this has minutes.



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ACKNOWLEDGMENTS.

The author's acknowledgements are made to the following gentlemen and firms for kind assistance in the preparation of this edition:—

- James Newman, 24, Soho Square, London, W. Catalogue of Artists' Colours.
- Howard and Jones, Bury Street, E.C. Colour mounters, who prepared most of the coloured plates.
- Noël Heaton. Questions re the technicalities of artists' colours.
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- J. W. LOVIBOND, Salisbury. Pamphlets relating to Colour and the Tintometer and a copy of "An Introduction to the Study of Colour Phenomena."
- THE DERBY-OXIDE AND COLOUR COMPANY, RUGELEY, Staffs. Samples of Oxide Paints.
- Madderton and Company, Ltd., makers of the Cambridge artists' colours, Loughton, Essex. Permission to reprint from their "Notes for Artists" and for samples of oil and water colours with which many of the tests herein recorded were made.
- GOODLASS, WALL AND COMPANY, LTD., Liverpool. Samples of Royal Rubinette, Fast Maroon, Golden Ochre, Fast Red, etc.
- Wm. Harland and Sons, varnish and colour manufacturers, Merton, Surrey. Samples of colours suitable for painting motor cars and other carriages.
- LEFRANG AND CIE, 18, rue de Valois, Paris, and 27. Fetter Lane, E.C., Samples of coloured varnishes, special chromes, etc.; folding book of colour specimens.

PLATE XIII.

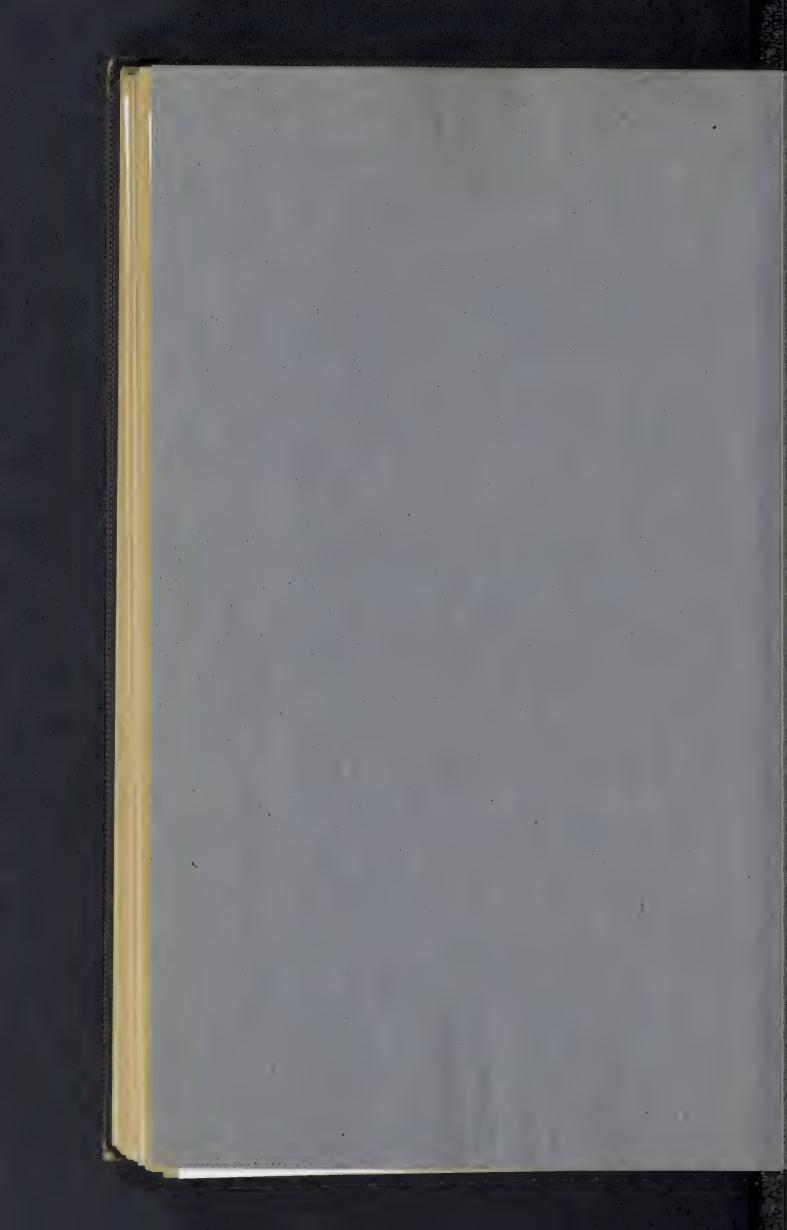
LIGHT OAK.

WALNUT.

MAHOGANY.

DARK BROWN.

Examples of "MATSINE" on Painted Surfaces.



- PILCHER'S, LTD., Morgan's Lane, E.C. Colour cards and tint books.
- TORRANCE AND SONS, LTD., Bitton, near Bristol. A pestle paint mixer.
- CASTLE BRAND Co., Newcastle-on-Tyne. Colour cards.
- Burt, Boulton and Haywood, Ltd., 64, Cannon Street, E.C. List of special paints, anti-fouling compositions, etc.
- GODDARD AND Son, Silver Street, Hull. Colourmounters. Plate VI. showing distemper plain and varnished.
- Lewis Berger and Son, Ltd., Homerton, N. Plate I. showing tints of various colours.
- PINCHIN, JOHNSON AND Co., LTD., 23, Billiter Street, E.C. Plates IV. and V., showing sixty standardised colours.
- Sissons Bros. and Co., Hull. Plate VI., showing specimens of Hall's sanitary distemper.
- ALABASTINE, LTD., Church Street, Lambeth. Plates VII. and VIII,, showing specimens of colour in alabastine.
- WILKINSON, HEYWOOD AND CLARK, LTD. Plates IX. and X., showing their Phasantite and non-poisonous colours.
- Reeves and Son, Ltd., Darwin Street, Dalston, N. Plate XI., showing specimens of their artists' water colours.
- Messrs. Mander Bros., Wolverhampton. Plates XII. and XIII., specimens of work in "Matsine."
- WERNER, PFLEIDERER AND PERKINS, LTD., Peterborough. Catalogue of mixing machinery.
- WINSOR AND NEWTON, LTD., 38, Rathbone Place, W. Catalogue of artists' colours and materials.
- George Rowney and Co., 10, Percy Street, W. Catalogue of artists' colours and materials.
- Major and Co., Ltd., Hull. Layers of wood stained with "Solignum."
- W. S. MERRIKAN, Hull. Colour books and cards.
- ALEXANDER, FERGUSSON AND Co., Ltd., 38, McAlpine Street, Glasgow. Colour cards and tint books.
- NAYLOR BROTHERS, 407, Oxford Street, W. Colour cards.
- JOHN J. BOWATER, Spon Lane, West Bromwich. Colour cards.
- WM. GARDNER AND Sons, Gloucester. Catalogue of sifting and mixing machinery.

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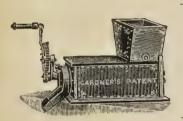
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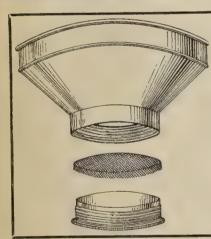
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